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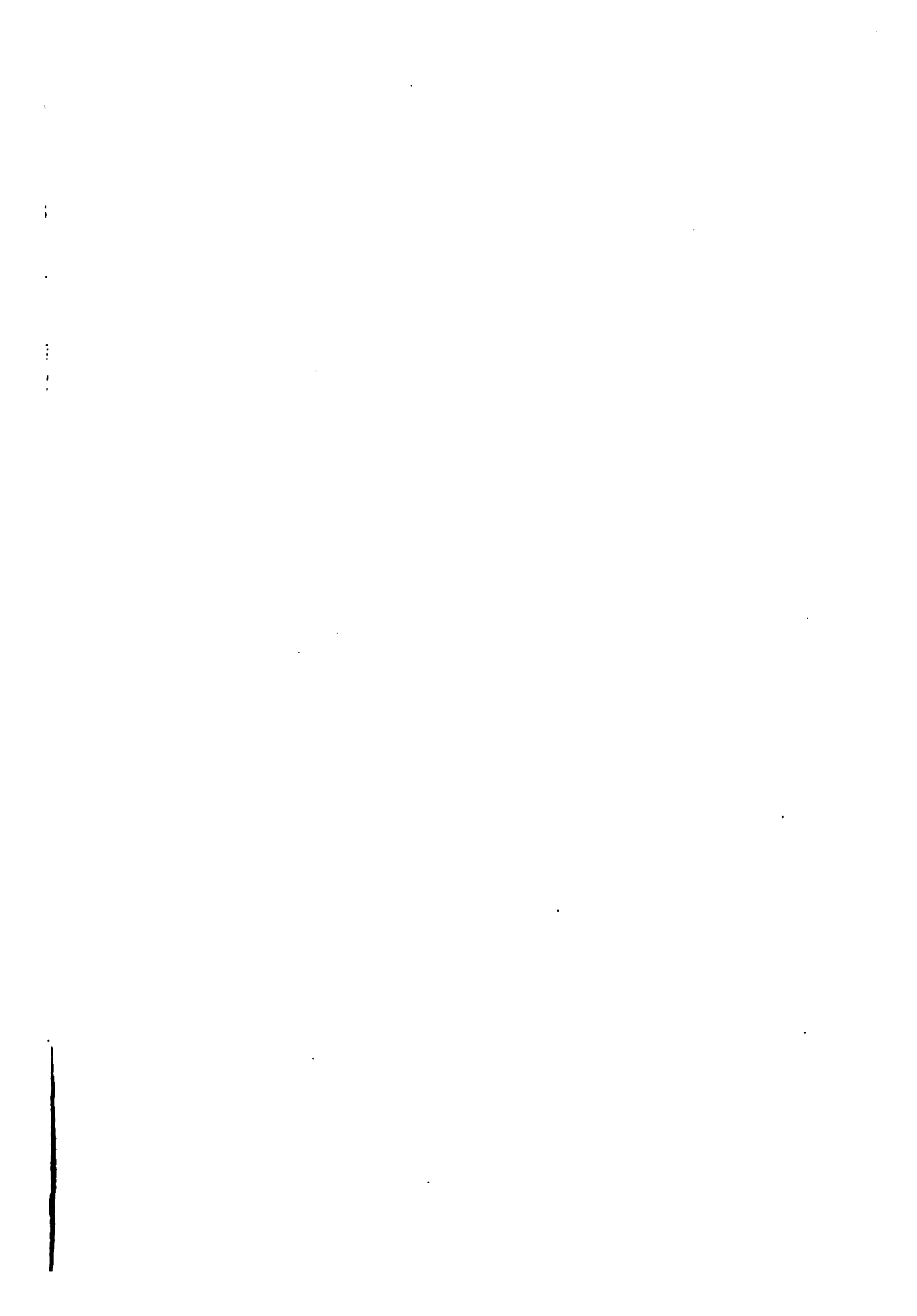
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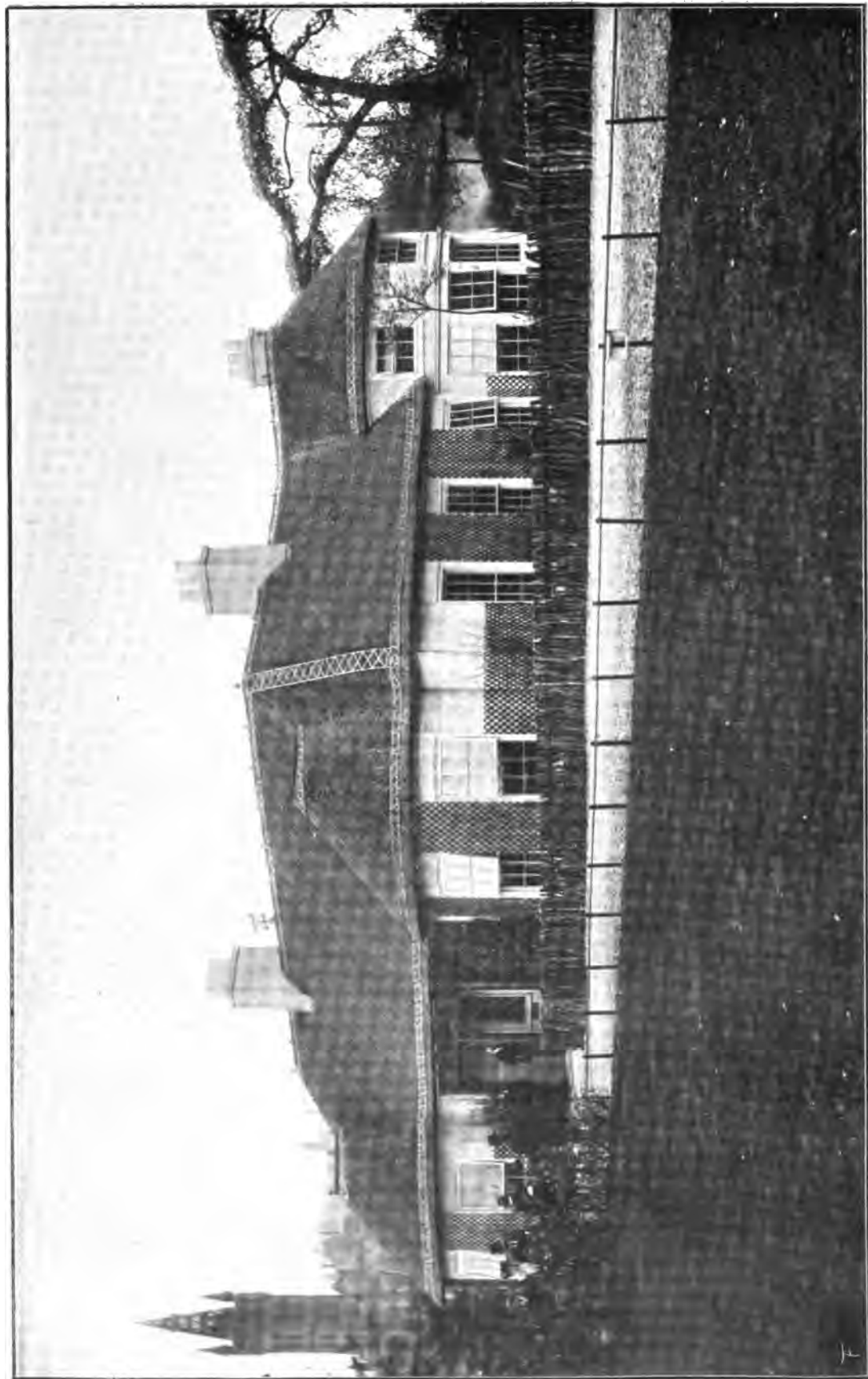
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**FROM THE
QUARTERLY JOURNAL
OF ECONOMICS**





A View of the Irish Pavillon.
Glasgow International Exhibition, 1901.

Department of Agriculture
and
Technical Instruction for Ireland.

IRELAND:

Industrial and Agricultural.

Handbook
for
THE IRISH PAVILION,
Glasgow International Exhibition,
1901.



DUBLIN,
1901.

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EDITOR'S PREFACE.

In January of the present year, the Department of Agriculture and Technical Instruction for Ireland decided to take part in the Glasgow International Exhibition, 1901, by erecting an Irish Pavilion in the Grounds, and displaying therein a representative selection of the characteristic products of Irish Industry. It was arranged, at the same date, that an official handbook dealing with Ireland's chief economic resources should be prepared in connection with the Department's Exhibit at Glasgow. This work was entrusted to my charge. Four or five months is not, in the best circumstances, an excessive time to allow for the compilation and editing of a volume of this kind. In the present case that period, so far as the preparation of this work went, was still further curtailed by the pressure of ordinary official duties, and the composition of three somewhat lengthy Statistical Reports. I cannot pretend that, so far as my share in it is concerned, the book has not suffered from these circumstances. At the same time I must express my thanks to my colleagues and the other contributors whose admirable work, for which no apology is needed, gives its value to the volume.

A word as to its scope. It was thought well to take the opportunity afforded by the publication of such a work to make it something more—indeed, something other—than an ordinary guide to the Irish Pavilion. The book opens with a description of the general geological and physiographic features of the country, followed by articles on the climate, flora and fauna of Ireland. An analysis of the economic distribution of the population is then given, preliminary to an account of the internal means of communication, and the banking facilities of the country. The next Section is devoted to agricultural and technical education and art instruction. As leading up to the functions of the State Departments in regard to agriculture and industry, an account is given of the splendid work done by some of the great voluntary associations of Ireland in developing the material resources of the country. Two chapters are occupied with a necessarily curtailed analysis of the work of the Congested Districts Board, and the powers and constitution of the Department of Agriculture and Technical Instruction for Ireland. The principal Institutions of Science and Art, which have now passed under the control of the Department are briefly described. Special articles deal with agriculture, live-stock, sea and inland fisheries, shipbuilding, the linen industry, the modern Irish lace

EDITOR'S PREFACE.

industry, and the Art and Cottage industries of Ireland. A complete index to the Exhibits in the Irish Pavilion at Glasgow is added. The articles to which no names are attached in the Table of Contents were, with one or two exceptions, prepared by the Editor, or compiled in the Statistics and Intelligence Branch.

I have to thank the following for permission to use certain blocks, for the purposes of illustration, of which they held the copyright :—The Secretary, Board of Education, London ; the Arts and Crafts Society of Ireland ; Messrs. Witherby and Son, the publishers of "Knowledge ;" Messrs. Charles Griffin and Co., the publishers of Professor Grenville Cole's "Open Air Studies in Geology ;" and the publishers of the "Irish Naturalist." Messrs. Sealy, Bryers, Walker and Co., Middle Abbey-street, Dublin, have printed all the plates in the volume, and that Firm is, I think, to be congratulated on the general excellence of the result. The half tone blocks supplied by Mr. Thomas Fitzpatrick, of 6, Upper O'Connell-street, also deserve a word of special commendation for their delicacy and finish.

In the preparation of the Handbook, and in the work of reading the proofs, I have been considerably aided by two members of my staff—Messrs. Thomas Butler and Walter E. Callan.

WILLIAM P. COYNE.

May, 1901.



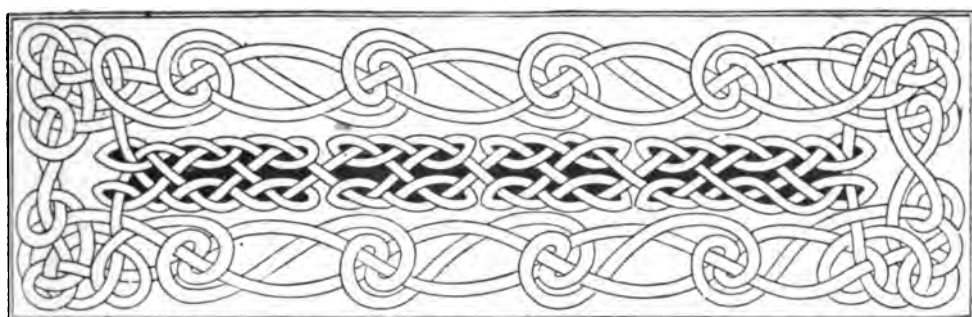
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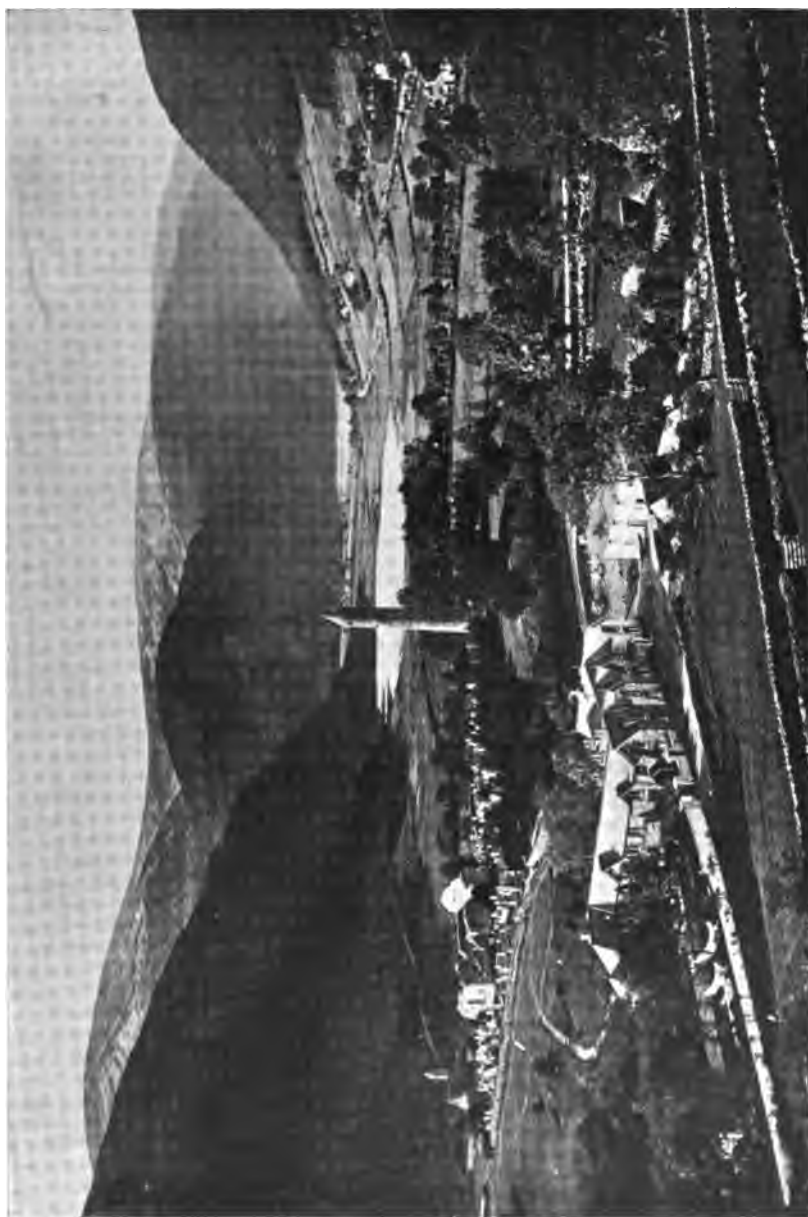


Fig. 1. Upper Lake, Glendalough, Co. Wicklow. Granite of Leinster Chain with Ordovician foothills.

THE TOPOGRAPHY AND GEOLOGY OF IRELAND.

IRELAND, lying on the western rim of the great Eurasian continent, occupies a position of extreme geological interest. The line along which a large body of water meets with continental land is now recognised as one of instability and unrest. It has long been obvious that the breakers are wearing away the rocks at one point, while at another they are depositing beds of shingle and fine sand. But, at the same time, the very floor of the ocean is rising or falling with the slow movements of the crust; the ocean is thus forced to recede before the elevation of a new coast-line, or is allowed, by subsidence, to creep in upon the land. Each movement, this way or that, leaves its record in the rocks. The masses that are already solid become crumpled together like a cloth; old marine deposits are forced up to form the outposts of a continent, until we find the shells entombed in them lying thousands of feet above the sea; or the land-surface, carved by rain and rivers, sinks beyond the reach of the destroying agents, and is gently buried beneath sheets of sediment in the ocean. The resistance or yielding of the borderlands that protect a continent often determines the fate of the continent itself. The rocks of Ireland thus record the main features of the history of Western Europe.

The present outline of the country is, geologically speaking, of modern date. The island rises, in fact, from the continental plateau, and is essentially a part of Europe. The line marking a depth of 100 fathoms upon the Admiralty charts runs from Norway, outside the Shetlands and the Outer Hebrides, keeps west of the Irish coast by 25 to 100 miles, and then passes down southward until it almost touches Spain. Beyond this line, the depths increase rapidly, as we reach true oceanic waters. Only 100 miles west of Co. Mayo, we find a depth of 1,000 fathoms, and 300 miles west of Co. Kerry we have the abyssal depth of 2,700 fathoms, or more than 16,000 feet. On the east, the channel between Ireland and Scotland is, at one point, only thirteen miles wide; and at Wexford it is only some fifty miles across to Wales. Between Stranraer and Larne, there is a singular depression, reaching down to 140 fathoms (840 feet); but this is quite local, and the sea between Ireland and Great Britain is rarely deeper than seventy fathoms. The small granite hills of Killiney, in Co. Dublin, could be cut off at the sea-level and pushed across from Kingstown to Holyhead, without their summits ever

becoming covered by the waves. On the other side of England, the broad North Sea, except for one channel that reaches down to 300 fathoms, close against the Norwegian coast, is similarly a mere film of water on the submerged plateau, and is rarely fifty fathoms deep. The connexion of Ireland with the continental mass is further emphasised when we note the outline of its coast. On the east, it is fairly smooth, with few conspicuous inlets; on the west the sea runs up by a number of long valleys into the land. This is the essential feature of the indented western coast of Scotland, and of the corresponding coast of Norway; in fact, the edge of Europe possesses the same characters from Bantry Bay to the North Cape.

In general surface, Ireland may be described as basin-shaped. The traveller will be struck by the mountainous appearance of the coast. Journeying westward from Holyhead, he may see from afar the blue line of the Wicklow Mountains, rising 2,000 to 3,000 feet above the sea. As he approaches Dublin, the details become clear; the rounded bosses of Killiney, the bold promontories of Howth and Bray, the broken masses of the foothills above Enniskerry, are only a foreground for that great granite moorland, which extends for seventy miles into the south. At Greennore, he meets a still more picturesque coast, the huge domes of the Mourne Mountains contrasting with the rugged Carlingford ridge, above the quiet water that stretches up to Newry. At Belfast, the rim of the country is presented to him in the form of long black scarps, terraced and forbidding, the edges of the high plateaux that spread from Carrickfergus away to Limavady. If our traveller passes westward, and rounds the coast of Donegal and Mayo, he views walls of rock at times 2,000 feet in height, the noblest cliffs in all the British Isles; he then encounters rugged Connemara, and the high limestone terraces of northern Clare. Farther south, peak after peak, range after range, bars him out from the interior of the country, culminating in the grey and cloud-capped masses that look down on Bantry Bay.

Surely, this Ireland must be a land of mountains. Yet the same traveller may cross from Dublin to Galway, a distance of 115 miles, without encountering a genuine hill upon the way. He may pass, again, from Dundalk to Mallow, and will feel himself in a great plain, above which a few ranges rise, quite unimportant when compared with the extent of brown bog and level meadow-land. The highlands of Ireland are, in fact, massed upon its margin; while the central area is a broad depression, in which numerous bogs and lakes have gathered. There is thus no well-defined watershed in the country, with rivers radiating from it. It seems much a matter of chance whether a stream rising in one of the central counties should run into the Irish Channel or the Atlantic. The plain is, in fact, a sort of gathering ground for the waters that trickle from the surrounding hills, and for the sand and gravel that they wash down.

It is well known that definite mountain-ranges result from the crumpling together of rocks in the earth's crust, and that this crumpling has been repeated after very long intervals of time. M. Bertrand and Professor Suess have shown us how the main folds in Europe can be grouped into four series, each of which has probably some representative in Ireland. By its very mode of occurrence on the spherical surface of the earth, an upward fold, called by geologists an *anticlinal*, is accompanied by a downward fold, styled



Fig. 2. Folds in Carboniferous Limestone, Beauparc, Co. Meath.

a *synclinal*; and commonly a number of anticlinals and synclinals occur together, giving us a contorted series. The results of earth-movements are complicated by actual fracturing of the crust; and the rise of one region usually implies the breaking up and falling in of another. When we examine the mountain-chains in detail, it by no means follows that the crests of ridges are formed by individual anticlinals. Where the rocks brought up from below in the crowns of the folds are such as resist the atmospheric agents, while softer beds lie in the synclinals, the rise and fall of the weathered surface may correspond fairly with the underlying folds. This is beautifully exemplified throughout the south of Ireland. Commonly, however, the surface-ridges give us little clue to the precise type of fold that underlies them. A synclinal of resisting rock, like the coal-measures of Kilkenny, may be left standing out as a highland, while an anticlinal, fractured at the top and exposed to rapid denudation, may be the first mass to be worn away. The general trend of mountain-ranges, however, is determined by the directions of the axes of their folds.

Before the existence of the Cambrian fauna, which is the first well-marked assemblage of life-forms upon the globe, the still older crust had become locally crushed and folded, giving rise to the *Huronian* system of mountain-chains. The sediments laid down in periods earlier than the Cambrian were thus converted into gleaming mica-schists and hard flinty quartzites; limestones became altered into crystalline marbles, and volcanic rocks into tough and dark amphibolites. Molten masses oozed into these from below, baking and often dissolving them, and giving rise, when consolidation took place, to granites, and, more especially, to the striped and streaky type of granite known as gneiss. These materials formed the hills and shores against which the Cambrian strata were laid down. In Ireland, there are but few traces of these "Huronian" chains. Yet they existed, and probably underlie part of the north-western highlands. Their gnarled and twisted rocks are clearly visible in Western Sutherland and the Outer Hebrides, and this axis, if continued southward, should reappear in Donegal and Mayo. But, as we shall see later, the existing features of these areas owe most of their characters to the later "Caledonian" folding.

Blocks of crumpled and gneissic rocks, however, are found included in Tyrone in the granites that are connected with the "Caledonian" folds. Clearly, then, an ancient gneissic floor existed where Ireland now is, and became broken up and involved in all the later movements. A great part of the tumbled uplands of the county of Londonderry, from Limavady westward, and almost the whole of

**North-west
Highlands.**

Donegal, are composed of crystalline rocks which are the oldest in the country. Mayo and Connemara also continue the same series, until it is lost to sight under Galway Bay. These romantic highlands, now carved out into peaks and ridges, with little lakes nestling in their hollows, carry us back to a time when Ireland, as we know it, had no separate existence, and formed a region on the edge of a great continent stretching north towards the pole.

We do not know if any *Cambrian* rocks were laid down in the Irish area, or if it remained in that period above the sea. Possibly the slates and quartzites of Howth and Bray, and their southern

representatives in the lower land near Wexford, belong to the same period as the Cambrian slates of Wales. The Great Sugarloaf, in Co. Wicklow, owes its beautiful form to the uptilting of a bed of altered sandstone (quartzite) belonging to this early series; the hard rock forms the peak, and its debris are showered, like a crown of snow, upon the slopes. The broken surface of Bray Head and of the promontory of Howth is due to the resistance of masses of similar quartzite among the more easily weathered slates and shales.

Bray Head Area.

The *Ordovician* or *Lower Silurian* strata were deposited almost continuously over the Irish area, followed by the *Silurian* (*Upper Silurian* of the Geological Survey maps). The edge of the northern continent must have dipped beneath the sea, and sands and muds were washed down from it, while beds of limestone, due to the growth of shell-fish and corals, accumulated off its shores. Such limestones are traceable in the Chair of Kildare, and at Portrane, near Dublin, full of Ordovician fossils. The more ordinary muddy sediments are now found in the foothills of the Leinster chain, and also in a broad area stretching from Drogheda and Cavan to Belfast Lough.

At the close of Silurian times, the subterranean forces began their work again in Europe. Volcanic eruptions had already indicated a considerable amount of unrest. Off

Portrane and Lambay Island.

Portrane, a cone had been reared, spouting out its lavas and ashes into the sea in which the corals grew—an interesting precursor of the conditions that prevail in the Pacific of to-day. The neck of this volcano, cold and crystalline, now forms Lambay Island; and the famous green "Lambay porphyry" is the mass that last consolidated in the vent. In Kerry again, we have a unique little volcano, of Upper Silurian age, which has left its lavas and banks of agglomerate in the cliffs of the Dingle promontory. Then the wrinkling of the crust set in. A series of huge folds were formed, with axes running north-east and south-west. Sometimes these were pressed over obliquely, and became broken through, while one part moved over another along surfaces of sliding known as thrust-planes. Old rocks, that ought to have been comfortably buried down below, were thus brought to the surface, and became piled on others of far later date. The Huronian chains were in part remoulded, and fragments of them were worked up into these new *Caledonian* chains. The latter take their name from the Grampian region, which was conspicuously involved in these disturbances at the close of Silurian times. Thus some of the leading lines of Ireland became early impressed upon our area. The north-east and south-west "Caledonian" trend, the trend of the axes in Scandinavia and in Scotland, is clearly seen in the structure of Donegal and the Ox Mountains, in the axis from Cavan to Belfast, and notably in the Leinster Chain. The folding was accompanied by the uprise of molten granite from below. This hot igneous rock, squeezed upward by the earth-pressures, filled the arches of the anticlinals, inch by inch, as they were formed. It attacked its surroundings, melting mass after mass from the walls, absorbing them into its substance, and sending insidious offshoots into the adjacent shales and sandstones. The sedimentary rocks forming the arches thus became baked and crystalline, and in places are bound to

the invading granite by a network of interlacing veins. As the weather worked down against the uprising chains, the coating of sediments was often worn away, and the granite, now cold and hard, was exposed as a moorland in the midst.

The backbone of Leinster, running south-west from Dalkey to the junction of the Barrow and the Nore, a distance of seventy miles, was thus formed by the Caledonian movements. On its flanks, Ordovician, and, perhaps, Silurian, strata, rise in

The Leinster Chain.

contorted masses, consisting of dark shales for the most part, and easily cut into by the rivers that flow from the central axis. Picturesque ravines and valleys, like those of the upper Liffey, with woods and old demesnes along them, mark this region on the east or west. In Wicklow, similar features, including the Glen of the Downs and the Devil's Glen, have been carved out of the older strata of the Bray series, which have also become involved in the flanks of the chain. As a contrast to this varied country, the high moors of Dublin, Wicklow, and Carlow, stretch in a uniform series of great domes, heather-clad and impressive in their vastness, where the granite core comes to light along the axis of the chain.

This rock, with its broad even joints and powdery products of weathering, gives rise in the course of ages to round-backed hills, with few conspicuous peaks, and with valleys smoothed by crumbling debris. The contrast between its characters and those of the stratified masses round it is well seen at the Upper Lake of Glendalough, where the sheer walls of shale and schist abut on the spurs of Lugnaquilla.

In the corresponding axis of Newry, granite has similarly welled up, and at Castlewellan is seen to be stuck full of fragments derived from its stratified neighbours. The whole Newry granite probably owes its darkened character to the

The Axis of Newry.

material absorbed by it; and the inclusions in it are often completely altered and crystalline, and are penetrated on a microscopic scale by the granite that attacked them. The Ordovician and Silurian rocks of Louth, Monaghan, and Down, form a broken country of small and frequent hills, with one of the most irregular surfaces to be found in Ireland.

As already hinted, the west and north-west highlands were certainly refolded in Caledonian times. Old knots of gneiss, like that of

E. Tyrone.

East Tyrone, had the younger masses pressed against them, and formed "eyes" round which the Caledonian earth-waves flowed. Granite veins traversed them, becoming especially conspicuous in the counties of Mayo and Donegal. It is often difficult to distinguish between the older Huronian granites and the new, throughout this mingled region of the West. But the trend of

The Ox Mountains.

Highlands of Donegal and Mayo.

the Ox Mountains, with their granite core, invading the schists and amphibolites, and running from Castlebar to Sligo, and the lines of fold and fracture in Donegal, such as the great glen from Gweebarra Bay to Sheep Haven, are clearly due to the Caledonian system of movements. At the same time, the Silurian beds were uplifted high and dry in Mayo, and have since been carved out into the noble masses of Muilrea and Ben Gormi, which look down

on Killary Harbour. The quartzite cone of Croagh Patrick is now known to belong to the same series of strata, which have thus contributed largely to the rugged scenery of the west.

This uplift at the close of Silurian times formed a continental area on which detritus began to gather, while great lakes spread across the hollows. The sea still lay to the south-east across Devonshire and Belgium; but the Irish and Scotch areas were included in the land. The weather soon laid hold of the Caledonian masses, and rolled down sand and pebbles from them into the lakes. Under the burden of débris thus poured into them, the lake-floors sank, as those of Eastern Africa have done since the time of their formation, and thousands of feet of freshwater strata were thus enabled to accumulate. This was the origin of the *Old Red Sandstone*, laid down in the *Devonian* period.

The boundaries of the old lakes are nowadays difficult to determine. The sandstone and conglomerate that form a hilly land between Lough Erne and Pomeroy may have been at one time continuous with corresponding beds in Southern Scotland. The great masses of the south of Ireland may have been connected on the east with the Devonian estuary of Hereford and Wales. In any case, the lake-deposits extended far and wide across our area, and their sandy nature has contributed markedly to the scenic features of the south.

The continental region again sank, and the sea flowed gently in, every year farther and farther, across the borders of the lakes. The *Carboniferous* period dawned. The Caledonian ridges remained long above the level of the waves, in the form of promontories and islands. The sea thus stole round the Leinster Chain, washed and finally submerged the isles of Bray, and Howth, and Lambay, and spread far to westward, dominating even the stubborn hills of Donegal. Patches of Carboniferous sandstone, laid down on the ancient shore, still cap some of the Caledonian masses in the West. The sub-

Ballycastle Coal.

mergence was here less marked, however, and the coal-beds of Ballycastle, in Co. Antrim, occurring in the lowest Carboniferous strata, show that a coast, with its accompanying forests and deltas, was near at hand upon the north.

The Carboniferous sea was an extensive one—a veritable ocean. Marine life was abundant in it, and foraminifera, corals, and shell-fish of all kinds, formed vast thicknesses of limestone on its floor. Here and there, the muds washed in from the islets of the Caledonian mass rendered the water turbid, and gave rise to the black shaly limestone locally known as *calp*. Elsewhere, even up to the shore-line, the deposits were remarkable for their purity. It is possible that no great rivers were scouring the adjacent land. The sea-floor went on sinking, the limestone grew in thickness, and to this day it forms the most continuous and most characteristic of all the Irish deposits.

The period closed with a general uplift, as gentle as that which had admitted the sea across the lakes. On the flats and deltas thus formed, the forests of the Coal Measures grew; and there is little doubt that at one time they extended far across Ireland. Tree-ferns, and giant club-mosses and horse-tails, the familiar vegetation of that remote epoch, clothed the Leinster Chain, spread westward into Kerry, and sheltered among the Caledonian ribs of Donegal. Very little of the coal that was formed by the decay of all these forests has, however, been left to Ireland. The new wrinklins of the crust wrought havoc with this valuable material.



Fig 3. Structural lines of Ireland. Dotted lines trend of Caledonian folds; thick lines trend of Hercynian folds.

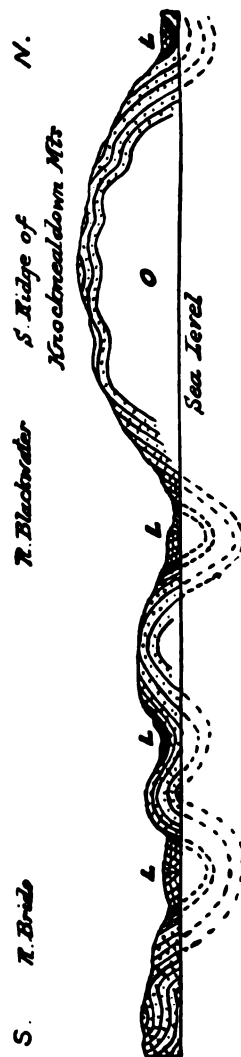


Fig. 4. SECTION OF FOLDS IN S. IRELAND. Length 9 1/2 miles; vertical scale 4 1/2 times the horizontal. L, Carboniferous Limestone in synclinals; O, Anticlinal Ridges of Old Red Sandstone. [After Mr. A. B. Wynne.]

With the close of the Carboniferous period, the third important epoch of earth-movement in Europe gave us the *Hercynian* folds, so named from the region of the forest-ranges in Western Germany. The general trend of their axes is from west to east. The floor of Belgium, of southern England and Wales, and of southern Ireland, became crumpled from south to north like a cloth pushed back across a table. As the slowly heaving earth-waves met the Caledonian masses, some deviation from the general trend took place, usually producing a conformity with the direction of the earlier axes. Thus, in England, the recoil from the tough old masses of Westmoreland and Wales drove the axis of the Pennine Chain into a north and south direction, perpendicular to that of the southern folds, which are seen in Wales and under London. In Waterford, Cork, and Kerry, the east

**Mountain-ridges of
Southern Ireland.**

and west trend is distinct and unimpeded; but the Hercynian anticlinal from Limerick to Portarlington, including the Slieve Bloom Mountains, follows the direction of the far older Leinster Chain. Away, again, in the north-west, it is probable that the antique core of the Ox Mountains served to direct the course of the earth-wave which rose against its slopes in Hercynian times.

The crumpling of Cork and Kerry was of immense significance to the scenery of southern Ireland. The crests of the anticlinals were at first formed of Coal Measures, of Carboniferous Limestone, and, in places, of Carboniferous Slate. These rocks were stripped off by weathering, and the Old Red Sandstone lay revealed below.

The action of the atmosphere was hereupon greatly retarded, while it could still carve away at the softer and often soluble strata that occupied the synclinal folds. Hence the anticlinals weathered out as ridges, running east and west, and the synclinals were worked down into valleys. The structure of the whole south is as simple as that of the Jura Range, when we take a broad survey of that classic area.

The beds are, however, so compressed together as to be often overfolded; and numerous minor wrinkles accompany the main and

**Courses of Rivers in
Southern Ireland.**

obvious ones. In the eastern area, the prevailing structure is evidenced by the courses of the Bandon River, the Lee, the Bride, the Upper Blackwater, and the lower portion of the Suir. All these rivers run east along synclinal hollows, which are mostly still filled by Carboniferous Limestone. West of the watershed that passes through the Boggeragh and Derrynasaggart Mountains, the streams run similarly along synclinals to the Atlantic; but their former valleys have been largely invaded by the sea, owing to subsidence of the coast in comparatively recent times.

The courses of the rivers in southern Ireland at the present day are thus clearly dependent on the direction of the Hercynian folds. But some of them, like the Lee and the Blackwater, seem at last to defy the anticlinal and synclinal axes, by turning abruptly south and cutting across them. Professor Jukes long ago supplied the explanation of this bending of the streams at right angles to what appears to be their proper course. The earliest drainage from the mass that was upheaved at the close of Carboniferous times gave us a system of streams running north and south. The general wearing down of the surface by denudation, in long subsequent times, carved out the

systems of east-and-west valleys in the synclinals, and in these the tributaries of the main streams ran. But the southward-running streams, having got the start, and working down the steep slope of the country, kept ahead of the tributaries, and maintained their own valleys at a lower level. Hence, although these tributaries spread farther and farther back, and became in time the most important portions of the rivers, their waters were still turned south where they joined the original gorges. As Professor Davis shows us, moreover, only the more active of the southward-running streams would cut their way down at a sufficient rate. While the valleys grew deeper along the synclinals, some of the tributaries would altogether fail to get into their original main streams; the latter would be, as it were, "beheaded," and would dwindle, while their former tributaries would swell the volume of the nearest successful primary stream.

Hence the rivers of southern Ireland, and, indeed, of Ireland generally, are older than the present form of the surface. General denudation has lowered and widened their valleys in some places, leaving other parts of the adjacent country standing at a higher level; and the rivers seem to cut across mountain-ridges, because the hard rocks of these ridges have resisted denudation, while the gathering-ground of the rivers, up stream, has been more rapidly worn down.

The original Hercynian mass was far more continuous than the present ridges, which have been carved out by ages and ages of denudation. We have pointed out that the Old Red Sandstone, where now exposed, once bore upon its back the thick mass of Carboniferous Limestone, and this in turn was covered by the Coal Measures. The loss of the latter is surely atoned for by the magnificent mountain-scenery to which the Old Red Sandstone has given

Mountains of Kerry.

rise. The Reeks of Kerry, the brown and purple masses of Killarney, the bare and grey rock-walls that look down on so many romantic valleys of the west, result from the exposure of the lake-deposits of Devonian times. The terraced structure of the original stratification, bed upon bed, is characteristic of these mountain-sides, and is seldom more clearly seen than in the neighbourhood of Derrynane and Waterville. On the east, the anticlinal ridges are more rounded and broad-backed; but fine craggy combs occur in the Galtees and in the Comeraghs, and the Old Red Sandstone country is still given over to moor and heather.

The contrast between the scenery of the Old Red Sandstone and that of the easily denuded Carboniferous strata is finely revealed around Killarney.

Killarney.

The Upper Lake lies among the mountains; the Lower Lake, with its flat northern shores and its low islets, lies on Carboniferous Limestone, and reminds one of the features of the central plain.

In the Dingle Promontory, a great unconformity separates two divisions of the Old Red Sandstone. The earth-movements disturbed the lower beds during the course of the Devonian period, and the later strata were laid down across their upturned edges. Were these movements belated relics of the Caledonian folding, or precursors of the Hercynian? At various points we meet with evidence of this kind, showing that the crust is never really at rest, although we mark out certain epochs of calm, and others marked by strenuous folding.



Fig. 3. Pass of Ballybeamagh, Co. Kerry. Scenery of the Old Red Sandstone.

The Coal Measures still remain spread across the country from Killarney to Galway Bay, but are unproductive from a mining point of view. They have been swept off eastern Limerick and from most of Tipperary; in the mountains round Lough Derg and in the Galtees, even the Old Red Sandstone has been cut through, and the Silurian and Ordovician rocks have come to light. But a broad synclinal lies between the joint Slieve Bloom and Devil's-Bit Range and the Leinster Chain; and in the centre of this the high

The Kilkenny Coal-field.

Kilkenny Coal-field stands. The Barrow on the east, and the Nore on the west, have cut out valleys which limit the intervening mass of Coal Measures; from either stream, the ground rises to the plateau of Castlecomer, in a series of scarps which remind one of those of Yorkshire, or of the edges of the similar synclinal coal-field of the Forest of Dean. The coal is anthracite, but has long been mined for local purposes.

On the west of the Coal Measures of this area, where the headwaters of the Suir and the Nore have exposed the Carboniferous Limestone, the country is a fairly level and plain-like region, in which the rivers wander. When, indeed, we round the coalfield at Stradbally, we look out over the true plain of Kildare, where brown bogs gather in the hollows, the haunt of plovers and nesting gulls, and where green demesnes and broad meadows speak of the fertility of the soil. There is here no rapid repetition of sandstone ridges and softer pastoral synclinals; on the other hand, one vast and shallow synclinal stretches from the Slieve Bloom Range to the Ox Mountains and Donegal Bay. The scenery partakes, in consequence, of the underlying geological monotony; the features of the cramped

The Central Plain.

southern synclinals are here spread out over the half of Ireland.

Yet the landscape is soft and pleasing, tender in its tints of green and brown; here and there the view is bounded by far blue hills, which lie always on the horizon, and which retain the same distant air throughout the journey of a summer day. Long ridges and heaps of gravel, the familiar "green-hills," are the only elevations near at hand. The great cumulus clouds that throw their shadows across the plain seem an essential portion of the landscape; the heavens and the earth here meet in a unity unknown amongst the sterner mountains. The sun shines out upon the white waters of a lake, fringed, perhaps, with a belt of larches or Scotch firs. The edge of the lake seems quite an accidental boundary, and the stones, when the water sinks sufficiently low, are seen to be excavated by solution into fantastic forms along the shores.

Lough Corrib.

Lough Corrib itself, with its low and flat-topped islands, is only a watery region of the plain. The eastern part of Lough Mask belongs, similarly, to the limestone area, while the ancient Silurian rocks rise in sudden dignity on its western shore. Clew Bay, dotted with islets, is merely another lake of the Carboniferous

Clew Bay.

Limestone region, into which the sea has become admitted in comparatively recent times.

The great and shallow synclinal which thus provides such uniformity of feature is split into two on the north-east by the old Caledonian axis of Newry, which runs in reality from Co. Longford to the coast near Strangford Lough. Hence, in this region, a tumbled and rougher country intervenes between the grazing-grounds of Meath and the lowlands of Lough Erne. The road from Dublin to Belturbet

provides a characteristic traverse of the old floor of Ireland, which here again rises to the light of day, the watershed occurring in an almost highland landscape at Cross Keys.

The Shannon, after its first rapid drop from Cuilcagh, a scarp of Upper Carboniferous Sandstone in Fermanagh, becomes essentially a river of the plain. It

The Shannon. wanders south through the broad limestone country, in an independent and unbounded fashion, now and again expanding into lakes, which are enlarged by the actual solution of their shores. At the south end of Lough Derg, it cuts across the local anticlines, amid mountain-scenery at Killaloe; but it then winds again over ledges of limestone to Castleconnell and the Atlantic. The Erne is a river of the same class, in which the lake-feature has become predominant. Lough Oughter, with its abundant islands, is really only a network of branches of the stream. Upper Lough Erne is little more; the wanderings of the river, in materials so easily removed, have here made it assume the aspect of a lake, the islets remaining as relics of its former banks. Lower Lough Erne possesses bolder features; but here we are in an area of more complex geological structure. On the south-west, bold masses of Carboniferous

Arigna Coal-field. sandstone, and even the Coal Measure cap-pings of Arigna and Lough Allen, have escaped the general denudation. The outliers of coal-bearing strata on these hills are a melancholy reminder of the amount that has been washed away from the great plain to southward. The Carboniferous Limestone also becomes lifted into prominence, and inland cliffs and scarps are weathered out of it, forming superb features in the landscapes north of Sligo.

The whole of the limestone region is marked, as in other countries, by the disappearance and reappearance of streams, which often run for long distances underground, and by the prevalence of caves produced by solution along these subterranean waterways.

At Dungannon, south-west of Lough Neagh, in a country where the limestone surface is more irregular than in the south, a patch of Coal Measures, containing ordinary household coal, has by good fortune been preserved. It is in part covered

Tyrone Coal-field. by later deposits, and forms an unexpected region of mining industry, close to the moors of Tyrone and Londonderry, where the Caledonian chains, and even still older ridges, come to light.

The Hercynian folding lifted the Carboniferous beds to a fatal height upon these north-west highlands, and only outliers remain to show their former extent. From Dungannon to Lough Foyle, however, a fairly continuous band of sandstones represents the shore-deposits of the old Carboniferous sea. As already mentioned, coal occurs in these strata away to the north at Ballycastle.

It must not be supposed that the Coal Measures were removed during a definite part of one geological period. Denudation, starting on the Hercynian chains, has been checked here and there for a time, and has then got to work again on the old surface of attack. The sum-total of the vicissitudes of the Irish region shows a large balance on the side of denudation.

After the great uplift at the close of Carboniferous times, the *Permian* sea flowed in upon the north, as it did over the corresponding English area. Then the *Triassic* period set in; and continental land,



**Fig. 7. Dyke cutting Chalk and Basaltic Lavas,
Cave Hill, Belfast.**



Fig. 9. Ice-worm Rock, Loo Bridge, Co. Kerry.



Fig. 6. On the Great Central Limestone Plain of Ireland, near Ballinasloe, Co. Galway.



Fig. 6. On the Great Central Limestone Plain of Ireland, near Ballinasloe, Co. Galway.

by a new swing upward, spread away for some 900 miles to the south-east. On its surface, deserts and shallow lakes occurred, the latter often drying up, and depositing layers of gypsum and rock-salt.

**Rock-Salt
of Carrickfergus.**

Thus the conditions in Triassic Ireland were much like those of Utah at the present day. The gypsum of Kingscourt and the Belfast district, and the rock-salt now mined near Carrickfergus, show that deposits were laid down, comparable to those of Cheshire. The conglomerates of the same period have given a name to Red Bay, in Co. Antrim, where the red soil, when ploughed, reminds one of eastern Devonshire. From Portadown to Magilligan Point at the entry of Lough Foyle, these soft Triassic sandstones are traceable above the Carboniferous deposits. Yet they lie more often on the Carboniferous Limestone and the Lower Carboniferous Sandstone than on the Coal Measures, thus proving how far the denudation that accompanied the Hercynian upheaval had already stripped away the coal.

Ireland was still destined to be denuded, rather than to be compensated for her previous losses. The Rhaetic and Jurassic sea, which stretched in again from the south-east, met with a shore in the ancient hills of Donegal. The downward dip of the area only allowed of the deposition of Liassic strata; while the continued subsidence in England, on the other hand, produced the well-known oolitic limestones of Bath and Portland, which are famous among building stones. The thin Irish representatives of the *Jurassic* system, the Lias clays of Co. Antrim, have a curious effect upon the landscape. Though little noticeable in themselves, they produce catastrophic landslips along the coast. The mass of chalk and basalt deposited on them in later times squeezes out the clays and shales. The chalk, moreover, is permeated by water, and this accumulates on the clays

**Landslips on
the Coast Road of
Co. Antrim.**

below, providing a lubricated surface for a landslide. The coast-road of Co. Antrim thus suffers at many spots from the movement of the cliffs above it, notably near Garron Point; and picturesque fallen masses and "under-cliffs" result. The village of Straidkilly, on the heights, is noted for the shifting and warping of its buildings, as the ground slips beneath them. Precisely similar phenomena, in the same systems of strata, occur on the coast of Dorsetshire near Lyme Regis.

At Portrush, the Lias is baked into a flinty porcellanous mass by the intrusion of basalt into it from below

Lias of Portrush.

during the Eocene eruptions. It is well seen upon the north shore, close against the town, and still retains traces of ammonites and other fossils.

The long period of denudation during Jurassic times was followed by a subsidence, of the north at any rate, during the latter half of the *Cretaceous* period. Conglomerates and sandstones, true shore-deposits, herald the sea's return. How far the waters spread over central Ireland is quite uncertain, for Cretaceous beds are only preserved under the great outpouring of basalt that covers almost the whole county of Antrim. The White Limestone, representing the Chalk of England, is about one-tenth as thick as that of Norfolk, but was deposited in fairly deep water towards the close. The ocean spread westward, as is

**White Limestone of
Co. Antrim.**

seen by the odd little outlier of chalk on the northern summit of Slieve Gallion, in Londonderry, now lifted 1,400 feet above the sea. The white cliffs near Portrush, and the beautiful band of white rocks, now coming down to the coast road, now receding far up in the hills, which stretches from Red Bay to Moira in Co. Down, belong to the pure oceanic deposits of the Cretaceous period. The contrast of this gleaming layer, now quarried for lime, with the grim black basalt crags above, is one of the most delightful in the country. Just

south-east of Fair Head, above the wooded hollow of Murlough Bay, the chalk forms the summit of the cliff, with a band of coarse

conglomerate under it; the latter was the shore-deposit, as the land sank in mid-Cretaceous times. Beneath this are the far earlier continental layers of the red Triassic sandstone, reposing in turn on a floor of ancient metamorphic rocks, which were probably folded and crumpled by both the Huronian and the Caledonian earth-movements. The Carboniferous sandstone and the Eocene basalts close at hand complete this "picture in little" of the many changes that the Irish area has undergone.

The Cretaceous ocean passed away in turn from north-west Europe. The former ooze of the sea-bottom was uplifted as consolidated beds of chalk. The skeletons of siliceous sponges, and other similar remains, had by this time become altered and re-deposited in the mass as bands and lumps of flint. The weather scoured away the soft limestone, and left the almost insoluble flints as pebbles on the surface. Hence chalk downs were formed, comparable to those of Surrey and Sussex, and flint gravels accumulated in their combs and hollows, as they do in the Home Counties of England at the present day.

On this occasion, the movements were fraught with more serious consequences than the mere uplift of a continental margin. As they continued, the chalk strata of Yorkshire became contorted, and those of Dorsetshire were in places set vertically on end. The Irish region was cracked across by numerous fissures, mostly running north-west and south-east, and molten lava oozed up these passages, and established a multitude of volcanic cones upon the surface. Sheet after

**The Plateaux of
Co. Antrim.**

sheet of lava was poured out across the undulating downs, filling up the hollows, burying the beds of gravel, and uniting with one another to form continuous and stratified layers. Little occurred in the way of explosive action. Here and there, as at Carrick-a-rede, a volcanic neck remains to us, choked with fragments of lava and chalk, torn off by the more violent eruptions; but on the whole the action was continuous and steady, until the broad land-area, from the Faroe Isles to Fermanagh, was covered with basalt, and was converted into a region of plateaux.

The cracks up which the lava welled are seen as dykes at the present day, the "whinstone dykes" of the northern peasantry, and stand out conspicuously across the white quarries of the chalk. The chalk is baked and rendered crystalline by contact with them, and is also compacted by the pressure of the mass of lava above; hence it has been justly styled the "White Limestone," in opposition to the soft English Chalk. The gravels above are reddened, and form a marked zone along the irregular surface of contact between the lava and the limestone.

Occasionally, a more massive intrusion has taken place, and the

great knot of lava has had its effect upon the modern landscape.

Slemish.

The huge crag of Slemish, where St. Patrick tended his master's sheep, is the one true mountain of Co. Antrim, and towers above the plateaux by reason of its toughness and resistance. It is formed of dolerite, a completely crystalline type of basalt, and was doubtless

Fair Head.

the neck of one of the later volcanoes. Fair Head is similarly made of intrusive dolerite, and the crystals of augite and felspar in some of the veins traversing it are an inch or more in length. This coarse mass has given rise to a superb cliff that faces the northern ocean, and its vertical joints, produced as it cooled, enable the frost and other agents to throw down enormous blocks on to the talus at its foot, and to keep the main crag sheer and imposing.

The jointing is here, indeed, actually columnar; and these regular shrinkage-cracks, so characteristic of cooling

Columnar Basalts.

lava, impart in many places an effect of titanic architecture to the cliff-walls of the Antrim coast. In successive tiers, the columns stand above one another, like those of some Roman amphitheatre. The bottom of each lava-flow cooled slowly, and the columns are there regular and well formed; the upper part cooled more rapidly, in contact with the variable currents of the air; and thus each great flow became divided into two layers, a basal one with well developed columns, and an upper one more rubbly and irregular. The next lava-flow spread over the older one, and the process of cooling was repeated. Here we have the secret of the alternation of columnar layers and duller bands at

Pleaskin Head, and of the beautiful structure of the Giant's Causeway, which is the basal portion of a flow that is traceable at a far higher level up the cliff. The connexion between Staffa, an offshoot of the Mull volcano, and the Giant's Causeway, is, of course, mythical, except in so far as both masses were poured out during the same geological epoch.

At Pleaskin Head and the Causeway, a red layer among the basalts easily attracts the eye. This is one of the bands of iron-ore which occur here and there in the basaltic region. They mark an incident that occurred about the middle of the volcanic epoch, when matters were calmer for a time, and when lakes accumulated in the hollows of the lava-flows. The waters entering them were highly charged with iron-salts, brought in solution from the decomposing basalts round about, and the beds of more or less nodular ore consist of the insoluble products, which were deposited as these salts broke up on oxidation.

These stratified iron-ores are mined in Glenariff; and another still more valuable material is associated with them. The destruction of the lavas, and especially of the rhyolites which are about to be described, set free, as occasionally happens, a certain amount of aluminium in the form of a hydrate. This gives us a clayey substance, which is often mixed with true clay (hydrous aluminium silicate). This material accumulated in the lake-basins as a fine grey mud, and is known as bauxite, an important commercial source of aluminium.

While the eruptions of basalt were quiescent, a completely different type of lava, the highly silicious rhyolite, welled up here and there, and produced the white and almost granitic rock that is quarried in

the dome-like hill of Tardree. Near at hand, on Sandy Braes, natural glass (Obsidian) was produced by the rapid cooling of these lavas.

The main interest, however, of these sporadic outbursts of rhyolite lies in their probable connexion with the

The Mourne Mountains.

Mourne Mountains. This handsome group of granite peaks, north of Carlingford Lough, is known to be of later origin than the adjacent "Caledonian" granite of Newry. The Mournes owe their boldness of detail, and their frequent craggy crests and walls, to their comparative youth. Yet, when viewed from a distance, as from the Great Northern Railway above Newry, they show the domed and rounded character which we associate with denuded granite chains. The Mourne granite cuts across an earlier series of basalt dykes, which abound upon the coast of Down; it is itself traversed by a later series. At Carlingford, similar granite invades the black and rugged mass of dolerite that forms the ridge between Dundalk and Greenore. This dolerite cuts the Carboniferous Limestone. The granite of Mull and Skye, again, is post-Cretaceous, and is of the same type as that of the Mourne Mountains. The chemical composition of these granites corresponds to that of the rhyolites of Tardree. Here are the facts that lead geologists to the interesting conclusion that the Mourne granite was intruded as a molten mass after the first basaltic eruptions had taken place in Ireland, but before the outpouring of the later basaltic series. It is, as it were, the deep-seated mass, the solidified caldron, of which the rhyolites of Tardree were the surface-manifestations.

What, then, was the age of these great eruptions, which have added, on the one hand, the high plateaux of Antrim and Londonderry, and on the other the glorious summits of the Mournes, to the varied scenery of north-east Ireland? During the lacustrine epoch, marked by the iron-ores, numerous plants were washed down into the clays. Mr. Starkie Gardner has determined these as belonging to the Eocene period, during which the London Clay and other marine deposits were quietly accumulating in the south of England. Hence, the volcanoes of Antrim are of *Eocene* age, and may have extended into the next period, the *Oligocene*. They were the forerunners of tremendous changes in the physical geography of Europe.

For, soon after the Irish outbreak, the ridges of the Pyrenees and the Juras appeared above the level of the sea; the Alps themselves followed, and the great Carpathian ring, accompanied by volcanic eruptions of their own. The Balkans, the Caucasus, the Himalayas, date from the same epoch of unrest; and the disturbances in the Scotch and Irish areas, on the edge of the old northern continent, may be said to mark the opening of the *Alpine* movements, which have built up the continents of to-day.

Moreover, the cessation of eruption in Ireland was accompanied by the breaking up of the northern land. The lava-plateaux cracked and subsided, and, as Sir Archibald Geikie shows us, now lie in great part on the floor of the north-east Atlantic. The basin of Lough Neagh was produced by a settlement of this kind, while the basalt on either hand remained high on the hills of Antrim and Slieve Gallion. The edge of Europe was now in process of formation; Ireland was, as it were, detached on the north and west from its ancient allegiance, and was tacked on to the new continent, still in its birth-throes, on the east.

Even now, Ireland was not an island. Through *Miocene* and

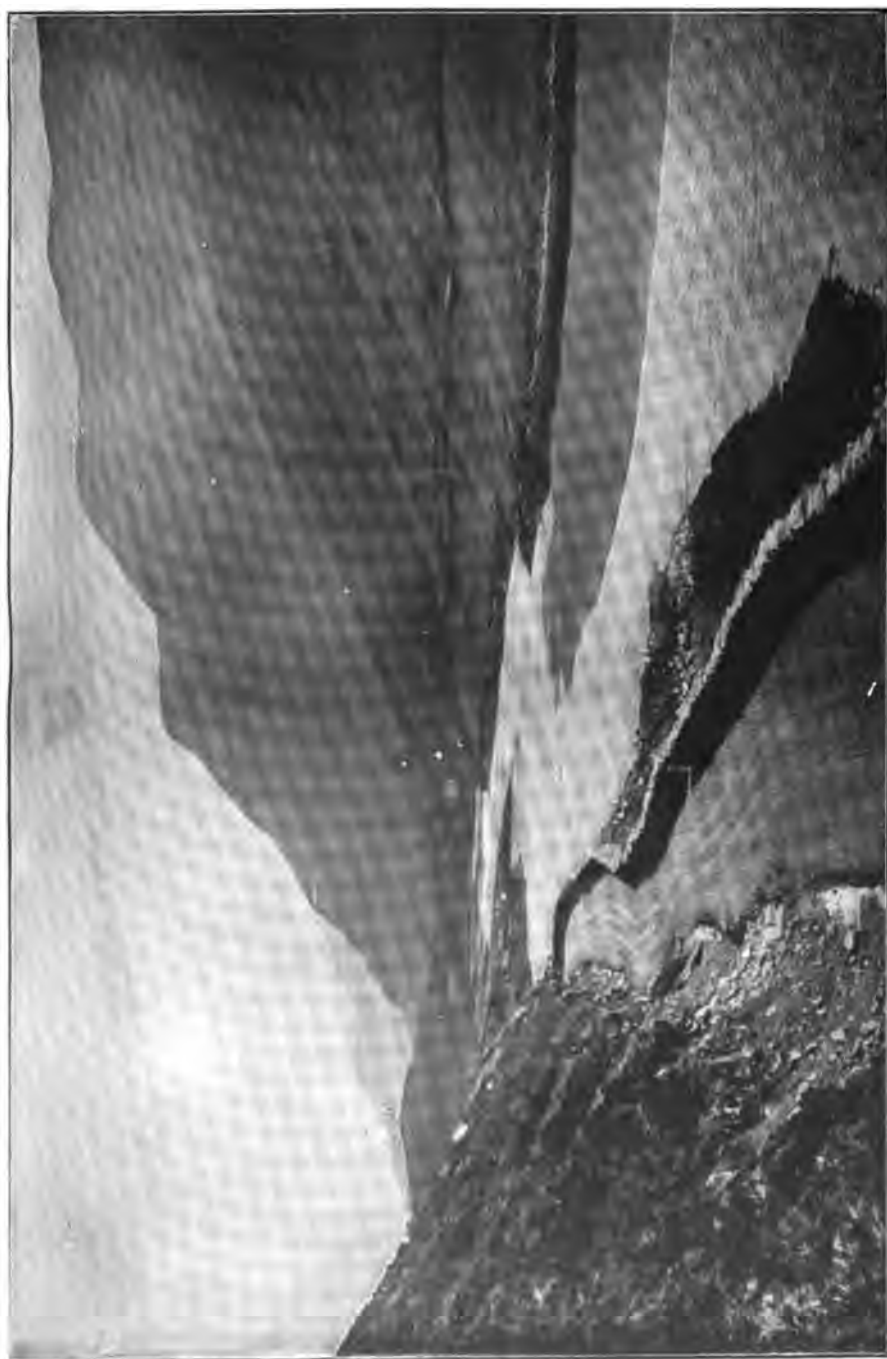


Fig. 10. Head of Killary Harbour, Fjord and Valley of the Western Highlands of Ireland.

Pliocene times it remained an integral part of Europe. Animals found their way into it which could not have swum or flown across the sea, but which necessarily wandered in upon dry land. Considering the antiquity of its own land-surface, Ireland may have nourished some forms of mammalian life before they could gain a foothold in Europe; but the strange epoch of cold in the northern hemisphere, known as the Ice-age, probably drove most of them eastward and southward. When they returned, in happier times, they still entered the Irish area on dry land. But a gradual subsidence was taking place, and Ireland was at last converted into an island on the European edge. Mammals continued to enter England, whereby the fauna of that country became richer than that of Ireland. In turn, by marine excavation, as well as by subsidence, Britain was cut off also, by the formation of the Straits of Dover and the shallow North Sea basin, and its fauna remains, therefore, limited in comparison with that of continental Europe.

During the Ice-age, or the *Glacial epoch*, the mountain-rim of

The Glacial Epoch.

Ireland was probably far higher than it is now. The glaciers that gathered on it have everywhere scored the surface of the rocks. The lower grounds of Kerry and Connemara, and even some thousands of feet of barren mountain-wall, have been moulded into the smooth round forms that are known as *roches moutonnées*, from their resemblance to the mammillations of a lawyer's wig. Between Kenmare and Glengarriff, these features are fully as evident as in the classic region of North Wales. Snow, compressed into a huge flat glacier, accumulated in the basin of the plain, which, as we have seen, was first marked out by the antique Hercynian folding, and which now served as the receptacle for all the débris of the mountains. The glaciers brought down, especially in their lower layers, abundant blocks and pebbles picked up in their passage from the hills; the streams running under the broad ice-sheet of the lowlands washed these materials along their courses, and piled them up in their groove-like channels under the ice. When at last the temperate climate was restored, and the ice slowly melted, these channels were recorded by chains of gravel, the well-known "eskers," which rise in wonderful freshness above the level of the plain.

The Eskers.

The Ice-age left the plain encumbered with glacial sands and gravels, and the valleys in the mountains were often choked, like Glencullen in Co. Dublin, with similar materials, through which the streams now cut their way. The abundant scratched blocks in these deposits show how the stones were once pressed against one another, and were pushed into the lowlands under the weight of solid ice.

The Irish Channel, as we have seen above, was formed since the glacial epoch, and was at one time even wider than it is at present. Clays were deposited on its shore, full of modern marine shells, which are now again lifted above the sea, and which form, to take one instance, the foundations of Belfast. The sickle-shaped promontory of Larne, whence the steamers start for Scotland, has been lifted some 20 feet since man himself came into the country.

During these comparatively recent oscillations, now one way, now

another, the whole western edge of Europe dipped sufficiently below the water to allow the sea to flood the western valleys. These had long been occupied by ice, and no débris could thus gather in their floors. They offered, as they sank and as the glaciers melted, clean and clear inlets by which the sea could penetrate the land. The fjords of Norway are the most notable example, running in places 100 miles into the hills. Those of Scotland and Ireland originated in the

**The Western
Fjords.**

same epoch of depression. Hence one of the most delightful features of the west, the narrow Killary Harbour, ten miles long and half-a-mile wide, is a true example of a fjord. Dingle Bay, the Kenmare inlet, Bantry Bay, and many others, are also submerged valleys; it is hard to believe that we view the waters of the Atlantic, lapping gently at high tide against the wild-flowers on the shore. Galway Bay and Clew Bay present the features of ordinary wide-mouthed areas of submergence, such as are styled "rias" on the Spanish coast; the sharp northern edge of the former, running east and west, suggests a fracture in the solid crust, with subsidence on its southern side. It is noteworthy that this line, when continued eastward, coincides with one of the lowest areas of the plain, the region between Galway town and Dublin.

The lowering of the east coast, attendant on the separation of Ireland from Britain, similarly produced rias or fjords. The Norse invaders saw in them a reminder of their own indented coast, and the names of Waterford and Wexford, Carlingford and Strangford, connect geology with history. The north coast also has its submerged valleys, in the long inlets of Lough Swilly and Lough Foyle.

Ireland, then, as we know her, this land of crag and glen, of lake and plain, owes the rich contrasts of her scenery to a long and complex series of events. Yet the main structural lines of the country were impressed upon it very early in its history. The Caledonian folding determined the heights of Donegal and the long backbone of Leinster; the Hercynian folding marked out the parallel ranges of the south, and, dying away to northward, settled the broad reaches of the central plain. The Mourne and the Antrim plateaux are the only recent features, and even they, somewhat proudly, can claim precedence of the Alps.

Lastly, it is clear that the natural incorporation of Ireland in the British Isles, and, through them, with Europe, has profoundly influenced her history. Her insular position laid her open to attack from a variety of nations, in times when it was far easier to travel by sea than to court the dangers and difficulties of the land. The early pre-Celtic inhabitants were thus invaded possibly by men of a central European race. A dominant tribe, which arose ultimately, and which was known as the Scots, occupied the plain, and ruled the country from the centre, as the Magyars now rule Hungary. The expansion and enterprise of the Scots enabled them to found a colony in Galloway, and their descendants gave a name to Scotland. In the ninth century, the Irish coasts were in turn harrassed by Norwegians, commonly spoken of as Danes, who seized a number of the ports, including Dublin and Limerick. They maintained communications from one settlement to another, and commerce sprang up in the shelter of the rias and the fjords. The value of these harbours was later realised by the freebooting Normans, who were, after all, distant relations of the Scandinavians. The royal authority planted castles to guard the entries of the ports, and

to keep the towns in Norman hands. The mountainous nature, however, of the rim of Ireland allowed descents on these strongholds to be easily made on the part of native tribes; while the forests and bog-land of the central plain prevented its settlement by the limited body of colonists, even as late as Elizabethan times. To this day the western mountains of Ireland mark the region where the old language is mostly spoken, while it prevailed quite recently in the corresponding highlands on the east. Throughout the country, the townlands still bear characteristic Gaelic names, which often suggest some natural feature of the landscape.

In this brief attempt to trace the influence of the physical structure of Ireland upon her history, our survey of the country well may end. It may be that one should be born a peasant among the purple hills of Connaught to know to the full the enduring fascination of the land. But to all of us it may be given to stand in some great meadow of the midland, and to hear the plovers calling, and to see the plain melt, as it were, against a soft and cloud-filled air; or to view from some high brown moorland the streamlets starting on their courses, and far below, in the precipiced combe, the gleaming of a rock-girt lake; or, again, at evening, to rest amid the crescent of the sand-hills, our ears filled with a murmur of Atlantic waves, and to catch far off, against the gold of sunset, some glimpses of the fortunate isles.



FIG. 8.—Granite pinnacles near Slieve Donard, Mourne Mountains.

IRISH MINERALS AND BUILDING STONES.

It will be clear from the foregoing general description of the geology of Ireland that the country depends largely for its coal-supply upon outside sources, notably on Scotland as regards the northern counties, and on Lancashire as regards the centre and the south. The many schemes for utilising peat as fuel on a commercial scale have not met with much success, confronted as they are by the nearness of the coalfields across the narrow channel on the east. The absence of native coal in most districts has checked the formation of industrial centres in Ireland; and even the metallic ores raised from time to time have been sent for smelting to Ayrshire or South Wales. The attention of the working population has thus become more and more directed to agriculture; and the introduction of steam machinery into almost every trade has still further emphasised the difference between the economic conditions that prevail in the Midlands of Ireland and those of industrial England. This question, however, has, obviously, two sides to it; and a population compelled to seek prosperity from the soil may perhaps be regarded as after all more fortunate than one which, year by year, becomes more closely crowded into towns. The utilisation of water-power for the production of electricity, and the employment of the electric furnace in metallurgy, may open new possibilities for Ireland; but at present her metallic ores remain in large part unproductive, and her coal is raised somewhat sporadically, owing to the readiness with which fuel can be imported from the richer seams in Britain.

It is obvious, however, that improved means of carriage from the mines to the main lines of railway may do much towards promoting a local use of Irish coal. There have been, for the past few years, twenty-four mines at work in the various coalfields, employing a total of nearly one thousand persons. Professor Hull's estimate, in 1881, of the "net tonnage available for use" in the Irish coalfields gave 182,280,000 tons of coal. About 125,000 tons are now raised annually, or little more than the figure recorded twenty years ago. The output of Scotland, with her rich coal-basins between Ayr and the Firth of Forth, is about 30,000,000 tons per annum, the amount having been nearly doubled in five-and-twenty years. Like that of South Wales, the coal of Ireland is very largely anthracitic, that is to say, it is not a brightly burning coal. The northern coalfields of Lough Allen and Eastern Tyrone produce, however, what is called bituminous coal, and the same is true of the limited Ballycastle and Carrickmacross areas. The great Kilkenny field, and all its southern companions, produce anthracite alone. This type of coal in Ireland contains from 80 to 90 per cent. of carbon, the ash being, in these extreme varieties respectively, 9·8 and 3·7 per cent. Sulphur is occasionally present in undesirable quantity; but other seams are practically free from it.

The Irish coalfields have been reported on fully by Sir R. Griffith, Sir Robert Kane, and the officers of the Geological Survey, and

offer, in most cases, a field for patient exploration rather than for speculation. Thus the favourably situated Coal-Measures in the Lough Allen (Arigna) area * are in the form of outliers on the tops of mountains of moderate height. The beds can be traced along fairly horizontal outcrops, and the sandstones and limestones below them are unproductive. Here, then, deep mining will reveal no further source of coal. At Ballycastle, however, the coal occurs in Lower Carboniferous Sandstone, the "Calciferos Sandstone" series of Scotland, accompanied by layers of clay-ironstone. This ironstone has been calcined on the spot, and exported for smelting in Scotland. The coal-bearing strata are exposed on the steep slopes and cliffs above the shore, both west and east of the bold dolerite promontory of Fair Head. They are mined by tunnelling into the face of the rock; and the dip causes the beds in some places to fall rapidly as they are traced inland. The degree of folding undergone by the beds being unknown as we pass south across the country, trial borings may possibly reach the same strata in convenient positions away from the sea-shore. The floor of ancient schists on which the beds were deposited comes to the surface, however, only two miles from the coast, both on the west and on the south, and thus no great thickness of coal-bearing strata can be anticipated as we proceed inland. We are here, in fact, limited by our position low down in the Carboniferous system, and far below the true Coal-Measures, which cannot therefore be struck by boring.

Here and there, in the undulating country between Lough Neagh and Lough Foyle, it is just possible that coal of the Ballycastle type occurs; but its existence in commercial quantities is extremely doubtful. Three hundred years ago, as Mr. G. H. Kinahan records, ironstone nodules were smelted in Drumard, near Draperstown, and they may be seen among the sandstones and shaly beds in some of the stream-banks of that locality. But none of the valleys that traverse these strata seems to have exposed a bed of coal to view.

The Tyrone coalfield has more promise, and provides some opportunity for a prospector. The surface of Coal-Measures exposed is small, and is definitely bounded by lower and unproductive beds upon the west. But, on the east, the coal-bearing strata run under the Triassic Sandstone, and may possibly be preserved by this covering for some distance towards Lough Neagh. Considering, however, that the Trias rests on Carboniferous Limestone in the valley of the Lagan, and also immediately south of Dungannon, great denudation must have occurred during what has been termed the Hercynian uplift. The Coal-Measures of Dungannon are not at all likely to extend beneath Lough Neagh. Locally, they must be regarded as rich, the Annagher seam being nine feet thick, and other seams running from two feet to five feet thick.

Efforts have been made to strike these beds on the east side of the lake: one boring was put down the neck of an Eocene volcano, the rhyolite that choked the vent being mistaken for a Carboniferous Sandstone, although its true character had been noted by geologists sixty years before the attempt was made. Another boring was made near Carrickfergus, and resulted in the fortunate discovery of rock-salt. Only by pure good luck can patches of Coal-Measures,

* For analyses, &c., of coal of this area, see R. J. Cruise, Journ. R. Geol. Soc. Ireland, vol. xiii. (1873), p. 144, and L. Studdert, *ibid.*, p. 146.

if such exist, be struck by borings put down through the superincumbent rocks in County Antrim. The black Silurian shales of Strangford Lough have been mistaken for Coal-Measures; but a very slight acquaintance with the fossils of that locality will prevent the repetition of so futile a speculation.

The coal that is often mentioned in the county of Cavan has a somewhat curious history. Part of the Arigna coalfield lies within the county; and true coal exists, in a limited amount, in a patch of Coal-Measures lying just beyond the eastern border. But curiously enough, bands of anthracite are here and there traceable in County Cavan in the Silurian strata, and were favourably reported on by Mr. J. I. Whitty in 1854.* The seam was in places four feet thick, and trial shafts were put down near Kilnaleck. The beds are, however, almost vertical, and the anthracite is much broken by masses of shale. Seeing that the strata are, at the latest, of Llandovery age, and that no plants likely to form coal existed at so remote an epoch, the continuity of the deposit is most improbable. It may, indeed, be, like the graphite of Bavaria and Ceylon, entirely of mineral origin. Near Ballyjamesduff, the beds seem impregnated with quartz and anthracite, while iron-ores occur at hand in the same series. Mr. Whitty's report seems to have been over-sanguine as to the value of the material as a fuel.

The Kilkenny coalfield, with its seams of anthracite, has its commercial centre in Castlecomer, and occupies a high synclinal basin, like the Forest of Dean in England.† Means of transport are still in a backward state; the upper and thicker seams have become already exhausted; and the coal as a rule contains a deleterious amount of sulphur, in the form of iron pyrites. It is possible, however, that the anthracite of Leinster may come into further use for commercial purposes, when better communications are established between the coalfield and the limestone plain. Already, 180 persons are employed at the Jarrow colliery alone.

The Coal-Measures of North Kerry and Clare cover a large area, but contain only a few thin coals. The iron ore associated with them was formerly smelted, especially in the seventeenth century. Mr. G. H. Kinahan, in his essay on Irish Mining, gives no ground for hope that this region will ever become productive. Coal occurs also in N. W. Cork, and is being sought there; but the spots where development may be best expected are in Tyrone, and on the hill-sides near Lough Allen. In the latter region, the associated clay-iron-stone has always been highly spoken of.

Bog iron ore, the limonitic deposit of existing bogs and stagnant pools, occurs where the waters of the locality are or have been well charged with salts of iron. This material has been found of use in the purification of gas, for which purpose it is exported from the county of Donegal. 4,321 tons of bog ore were raised in 1899. Ochre, for paint, is raised in County Wicklow, in connection with the Ovoca mines.

The only other iron ores regularly worked in Ireland in recent years are those formed in the lakes of Eocene times, and found interbedded among the Antrim basalts. The official reports of the Inspectors of Mines record no "ironstone" as raised in

* Journ. Geol. Soc. Dublin, vol. vi., p. 187.

† For details of coals, see G. H. Kinahan Journ. R. Geol. Soc. I., vol. vii. (1886), p. 20.

connection with the coal mines in Ireland during 1899, but 102,262 tons of iron ore are recorded from the metalliferous mines. In 1898, 113,271 tons of this ore were raised, the whole of which is credited to County Antrim.

These stratified iron ores of northern Ireland have been described in detail by Mr. Philip Argall,* who was inclined, however, to refer them to volcanic mud-flows, rather than to the products of weathering of the earlier basalts. The richest ore is pisolitic, like that deposited in some recent lakes, and is at times a bright red earthy hæmatite, at times brown and limonitic, at times, again, black and magnetic, with about 10 per cent. of titanium dioxide. The black type of ore, according to published analyses, consists largely of dark hæmatite; but some of the granules are formed of magnetite, and even show polarity. The beds are worked between Glenarm and Broughshane, and the actual ore is often a foot in thickness.†

Intercalated among these interesting strata is bauxite, a hydrous aluminium oxide, associated with some pale clay, and giving at times 57 per cent. of alumina on analysis. This was formerly worked, under the name of "alum clay," for the manufacture of alum, and is now the commercial source of the metal aluminium. Bauxite occurs both in the Glenarm district and near Ballintoy. Mr. Kinahan states that the alum industry commenced in 1874, and that the beds were worked "more especially near Ballintoy." In 1898, 12,402 tons of bauxite were raised, valued at nearly £3,000, and 8,009 tons in 1899. Antrim furnishes the only record for this material in the United Kingdom.

The mining of other metalliferous ores in Ireland depends very largely upon the fluctuation of prices in the trades directly concerned.

Copper, which is practically all in the form of Copper Pyrites, was at one time very profitable, the ore being sent to Swansea and Lancashire to be smelted. Chalcosine or Redruthite (called in

Ireland "grey copper ore," a term usually applied to Tetrahedrite), and Malachite, the green carbonate, were also worked on a limited scale. From 1840 to 1843, the annual output of the Ballymurtagh Mine in County Wicklow averaged nearly 6,000 tons of copper ore, while the whole output of copper ore for Ireland in 1899 is recorded as only 533 tons. Development is proceeding in some of the old mining districts of the south such as the Dhurode mine, in County Cork; but the raising of copper ore has been long confined to County Wicklow.

Mr. Argall,‡ described the "ancient and recent mining operations" of East Ovoca in 1879; but the best historical accounts of the whole area are to be found in Sir R. Kane's work and in Mr. Kinahan's "Economic Geology." The occurrence of iron pyrites (pyrite) with the copper ore, often in preponderating amount, has led to the same mines being worked for iron, copper, and sulphur, according to the requirements of the day. The pyrite is known as "sulphur ore," and forms the bulk of the material raised at the present time, the output amounting to 2,584 tons in 1898, and 2,411 tons in 1899.

The south of Ireland was in former times essentially a copper-

* Journ. R. Geol. Soc. L. vol. vi. (1881), p. 28.

† See Mem. Geol. Survey to Sheet 20 (1886), pp. 12-16 and 28-31. Bauxite is touched on in the same Memoir; but its more important application is of later date than 1886.

‡ Journ. R. Geol. Soc. L. vol. v., p. 130. See also report by Sir Warrington Smyth, Records of the School of Mines, vol. i. (1853), p. 370.

producing district, and the success of the mines at Knockmahon and Bonmahon, in Co. Waterford, and of the Allihies mine west of Berehaven, in Co. Cork, encouraged a considerable amount of speculation. Here, again, copper pyrites is the prevailing ore. In some cases, energetic working for half a century has removed the profitable portions of the lodes, and the mines may not be worth re-opening, even when copper reaches a very high market-value. Mr. Kinahan points out that the Bonmahon group of mines was well exploited from 1824 down to the dismantling of the works in 1880; but veins and pockets may yet be struck in the south of Ireland which will provide material of equal value to that of the worked-out undertakings. Some of the ultimately successful areas were abandoned or sold by previous owners because the first years of work were discouraging.

Copper pyrites has been sporadically mined in many other parts of Ireland. Even at the sea-inlet of Loughshinny, south of Skerries, in Co. Dublin, adits exist in the Upper Carboniferous shales, from which, as Kane says, ore was "raised from time to time."

Lead and zinc are commonly raised together, the two sulphides, Galena and Blende, being the prevalent Irish ores. Fine crystals of Cerussite (lead carbonate) have been obtained from the mines of Glenmalure, in Co. Wicklow; while Smithsonite (zinc carbonate) occurs, as a product of replacement of limestone, in the Silvermines works near Nenagh.* As is well known, silver is a common accessory in galena, and the argentiferous ore was worked at Silvermines even in the seventeenth century. The richness of this lode makes further prospecting advisable, both in West Tipperary and in Clare.

Galena is at present raised, to the extent of 30 to 40 tons per annum, in Co. Wicklow, the ore in Glendasan giving 8 to 10 ounces of silver to the ton. Smelting is still carried on at Ballycorus, in the south of Co. Dublin; but the ore is imported, and the old workings in the Ordovician shales, like so many lead-veins in Ireland, are regarded as now unprofitable. While a great number of occurrences of galena have been recorded from the Carboniferous Limestone area, it cannot be said that this ore is limited in Ireland to any particular formation.

The abundance of prehistoric gold ornaments in Ireland has suggested that the metal was of local origin; and this is by no means unlikely, despite the barter and commerce that went on in Europe, even in the remote period when these articles were fashioned. The metal, however, was doubtless alluvial, and had accumulated in the gravels of Wicklow, and perhaps of Donegal, for untold ages before man came into the country. When its use and value became discovered, the deposits doubtless were rapidly worked out, and the centuries that have since elapsed have seen only a trivial amount of denudation and accumulation, compared with the long epochs that went before. Hence in Ireland, as in Peru, latter-day gold-mining has been of little importance, and the

* Jukes, *Journ. Geol. Soc. Dublin*, vol. x. (1863), p. 12. Apjohn records also electric calamine (*Ibid.*, vol. viii., p. 167); and Wynne has given a general description of the Silvermines district (*Ibid.*, vol. viii., p. 244).

† The Laganure lodes are described by Sir Warrington Smyth (*Records of the School of Mines*, vol. i. (1853), p. 333; see also Haughton, *Journ. G. S. Dublin*, vol. vi., p. 168).

material may be sought with most success in the tombs and hidden treasures of prehistoric chieftains.

The Croghan Kinshelagh and Ovoca districts in the county of Wicklow have, however, produced considerable quantities of gold from alluvial workings during the last hundred years; and it was the opinion of Mr. Gerrard A. Kinahan* that the deposits were by no means exhausted. Mr. E. St. John Lyburn, A.R.C.Sc.I., in a paper presented to the Royal Dublin Society in 1901, has proved, by a large number of assays, the general poverty of the Wicklow rocks in gold; but at the same time he urges that many of the gravels remain unexplored, especially in their deeper layers, or on the shelves above the present streams.† Mr. Gerrard A. Kinahan's paper contains an excellent account of the history of gold-working in Co. Wicklow, whereby it appears that the value of the metal raised only occasionally exceeded the cost of mining. Probably, the really profitable transactions were those of the peasantry, who from time to time stored up a little gold, which they had washed out by the most primitive means, and brought it for sale to the jewellers in Dublin. It is currently reported that this practice still continues. The gravels to the north and north-east of Croghan Kinshelagh were worked by Government from 1796 to 1803, when the operations were finally abandoned. Various companies have examined the deposits since that date, finding gold, it is true, but not with sufficient uniformity.

The occurrence of cassiterite (in the form of stream-tin), with its constant associate wolfram, in the auriferous

Tin.

gravels of Croghan Kinshelagh, has also excited curiosity. This instance, and the finding of a small quantity of tin ore in a lead-vein at Dalkey, are the only authenticated records of cassiterite in Ireland. In Co. Wicklow the original vein has not been discovered.

Among minerals which are not metallic in the popular sense, rock-salt deserves the most prominent mention. The well-known beds near Carrickfergus, in Co. Antrim, were discovered in 1850, when

Rock-salt.

the Triassic clays and sandstones were being pierced in the hope of finding coal. The site offered, in reality, only a very small chance for the coal-prospectors; but the borings proved the existence of deposits of rock-salt comparable with those of Cheshire. One of the beds at the Duncrue mine was actually eighty feet in thickness. The records show that 34,773 tons of salt were raised from this limited area in the east of Antrim in 1899, with 12,282 tons obtained in addition from brine.

While the gypsum associated with the same strata near Belfast is mostly in thin veins, this mineral has been

Gypsum.

worked, for the preparation of Plaster of Paris, from a much thicker mass in the Triassic outlier near Carrickmacross.

Barytes, another white salt, occurs in veins in many places, as in

Barytes.

the Ordovician strata of the coast of Co. Dublin; but in Co. Cork it is of unusual mass and abundance.‡ Near Bantry, a vein

* "On the Mode of Occurrence and Winning of Gold in Ireland," Journ. R. Geol. Soc. I., vol. vi. (1883), p. 176.

† See also a paper by Mr. George H. Kinahan, Journ. R. Geol. Soc. I. vol. vi. (1883), p. 207.

‡ See F. T. Hardman, "On the Barytes Mines near Bantry," Journ. R. Geol. Soc. I., vol. v. (1878), p. 99.

is found from ten to fifteen feet thick; and a remarkable lode, like the infilling of a chimney, thirty feet long and fifteen feet wide, also occurs. Barytes is also mined at Gleniff near Bundoran. 4,860 tons of barytes were raised in Ireland in 1898, and 3,278 tons in 1899. The material, it may be observed, is mined to a yet larger extent in each of the counties of Northumberland, Durham, and Staffordshire, and is clearly of commercial interest.

The soft magnesium silicate, Steatite, a massive form of talc, occurs here and there in good veins, but is often mixed with harder minerals which destroy its utility. At Crohy Head, and Gartan, however, in the county of Donegal, considerable and good beds occur among the ancient metamorphic rocks.

While Ireland cannot claim especial richness as a mineral country, she is essentially a stone country, and quarries have been opened everywhere for building purposes and for road-metal, even through the sands and gravels of the plain. Naturally, limestone is the chief substance excavated; and the frequent deficiencies of the Irish roads are due to the general use of Carboniferous limestone as a metaling. The country possesses excellent igneous rocks, which should be imported into all districts where they are required. In this matter, the growing practice of England, and of many foreign states, notably Saxony,* is strongly to be commended seeing that good roads are far more economical to maintain than bad ones, and that they give an impetus to activity and intercommunication such as no main line of railway can bring about. In Ireland, far more than in England, the roads perform the functions of branch lines—witness those numerous stations named after roads, which are situated miles away from the towns which they are meant to serve. When the selection of proper road-metal is seriously considered in rural districts in Ireland, the country itself will be fully able to cope with the demand.

The clays used for bricks have been mostly derived from the Glacial drift-deposits, where these are not too highly charged with limestone debris. The Triassic clay of Kingscourt has produced good results, while the Carboniferous fire-clays are raised in connection with some of the coalfields. These ancient shales, when crushed, yield bricks capable of resisting a high temperature, provided that they are not ferruginous.

True porcelain-clay, or kaolin, does not appear to have been utilised in Ireland; nor is it known to occur to a sufficient extent, washed out naturally from the granite areas. The materials mentioned under this head by Mr. Kinahan are really artificially crushed felspathic rocks, without the composition of true kaolin. The famous pottery of Belleek, in Co. Fermanagh, was thus formerly made from the crushed alkali-felspars of the granite on the north shore of Lough Erne. The material used is still a felspar, but is imported.

The diatomaceous earth which has accumulated in such purity near Toome, in Co. Antrim, where the Bann flows out of Lough Neagh, is now worked for various purposes, under the commercial name of "kieselguhr."

* See O. Hermann, "Steinbruchindustrie und Steinbruchgeologie" (1899), p. 351, where an analysis is made of the Saxon highways, proving that the limestones and soft rocks that form 40 per cent. of the surface of Saxony are *nowhere* employed upon the public roads.

Irish slates have suffered, from a business point of view, through the proximity of the enormous supplies of Llanberis and Ffestiniog, in N. Wales. A local use has, however, been found for many slates occurring in inland or western localities. The quarries in Ordovician strata in Clashnasmuth townland, six miles from Carrick-on-Suir, have a sound reputation, some of the material being selected, on account of its green colour, for special decorative effect. Similar slate is raised not far away in Co. Kilkenny, from the Ormonde quarries at Kilmoganny. Near Killaloe, again, roofing slates are raised. The firm tough slate of Valentia Island, in Co. Kerry, is suitable for flags and slabs, which are obtained there of an unusual size.

Slate.

The fine-grained bedded sandstones of Coal-Measure age in Ireland are at times extremely tough and durable. The dark flags of South-west Clare, and the similar slabs raised in Co. Kilkenny, and sold as "Carlow Flags," have been, in consequence, widely used for paving.

Flags.

The best Irish sandstones for use in architectural work in towns, and some of the finest in texture in the British Isles, occur in the Carboniferous system in the counties of Donegal and Fermanagh. The stone of Mount Charles in Donegal, though of course not so easily worked as limestone, is capable of receiving a sharp edge, and of being used for moulded work of a delicacy unusual in this class of material. While the soft Triassic sandstones, like those of Scrabo, in Co. Down, are not suitable for monumental work in the smoky atmosphere of towns, and while much of the Old Red Sandstone of the south must be put aside on account of its coarseness of grain, the Carboniferous sandstones may receive more and more attention as time goes on, and may be found worthy of export to the manufacturing cities of England.

Sandstone.

There is no lack of good grey Carboniferous limestone in the broad central Irish area, and much has been done with this material, both for massive structures and for decoration. The shaly varieties, black through included mud-particles, and locally known as "calp," are to be avoided for all but common walls, since they weather out unequally along the planes of stratification. The opposite type, uniform and fine-grained, is seen in the grey limestone of Ballinasloe, in which excellent carved work has been effected, and which is practically a marble, utilised as a building stone.

Limestone and Marble.

The Carboniferous limestones become occasionally dolomitic, the change being, as usual, marked by the introduction of iron as well as magnesium. The rock, in consequence, becomes brownish on oxidation, sometimes in flecks and patches. This variegated colouration enhances the effect of certain varieties, and makes them serviceable as ornamental marbles.

The black marbles of Ireland have long been famous. They are Carboniferous limestones coloured by a small percentage of graphitic carbon, and have been quarried mostly near the cities of Galway (Menlo) and Kilkenny (Archer's Grove). The Menlo rock provides pure black stone, while the white sections of fossil brachiopods afford a striking feature amid the black ground of the marble of Kilkenny.

Other marbles that have achieved marked success for decorative work are the red varieties of Co. Cork. The rock of Little Island is the richest in colour, showing, on polished surfaces, a brecciated structure, with flowing lines and veins. It has been largely used for columns and the panelling of walls. Red marbles, merging into grey with pink calcite veins, are quarried in the same county at Midleton and near Fermoy. These are all of Carboniferous age, and possess a beauty similar to that of the Devonian marbles of the Plymouth area.

The white marbles of the county of Donegal have been examined by prospectors from time to time. Many are true calciphyres, containing silicates developed in them; or they possess numerous micaceous partings, which hinder their use in large blocks, owing to the planes of weakness thus established. There is, however, a possibility of raising stones of sufficient size in the deeper parts of certain quarries. It must be borne in mind, however, that the metamorphic action and earth-stresses that have affected the whole county of Donegal have converted almost every material alike into schistose masses traversed by an immense number of joint-planes.

The absolutely unique green marble of Connemara has been much sought after for decorative use. It varies greatly in texture and colour, and is mineralogically unsuited for outdoor work; but its very irregularity and its banded structure render it one of the noblest of indoor ornamental stones. Under the name of "Irish Green," yellow-green stones from Ballynahinch, and magnificently tinted and striped masses from Lissoughter, have been sent to all parts of the world. In common with other well-known types of Irish marble, this material is finely displayed in the decorative work of the Museum of Science and Art and the National Library in Dublin. It owes its special colouring to the serpentine which permeates it in knotty bands and curving layers. This mineral has doubtless arisen from the alteration of olivine; and the rock probably at one time resembled the banded olivine-marbles that are produced by the contact of lava and limestone in the volcanic vent of Vesuvius.

The great demand for ornamental stone that will resist atmospheric influences in industrial cities has drawn especial attention to granite and allied igneous rocks. Granite has long been used as a building material in Ireland; the grey muscovite granites of the Leinster chain thus furnish the basement-courses of hundreds of unpretentious houses, which are continued upwards in ordinary red brick. Polished granite, however, has proved itself to be the handsomest and most durable material for city work. The transformation of London façades in the last thirty years testifies to the prevalent tendency among architects and the merchant-princes whom they serve. In London, which is naturally the purchasing centre towards which Ireland must chiefly look, the grey granite of Aberdeen, the red and uniformly-grained granite of Peterhead, and the speckled porphyritic red granite of Shap, have been used with a repetition that has almost begun to pall. Swedish and other granites have been introduced to give variety, and many among these importations are granites only in the liberal and commercial acceptance of the term. The fine-grained grey granites of the Newry axis, quarried at Altnaveigh, Moor, Goraghwood, Bessbrook, and other places, have successfully held their own in the London market; but rich stores of red and variegated granite remain still practically unde-

veloped in the west of Ireland. Notable among these are the Galway granites, now quarried at Shantallow. Besides a compact chocolate-red and speckled type, porphyritic granites occur, with red felspar in a ground of mingled green and red. The green colouration, being largely due to epidote, implies, in this case, a general hardening, and not a softening, of the mass. These handsome rocks, like those of Mayo and Donegal, lie near the coast, whence cheap carriage might be available.

The granites of Donegal have been worked from time to time, and a company is at present engaged on those around Dungloe. The rocks here offer great variety of colour, a consideration of much importance, seeing how often red and grey stones are used in the same public building. The granite of Tamney, Milford, is also being worked by another company.

The importance of the granite industry, even in its present position, may be gathered from the fact that 165 persons are employed in the county of Wicklow alone in extracting granite for ordinary building work, fifty of these being at the Ballyknockan quarry, near Blessington. More than 100 men are employed in one of the Newry quarries, and fifty in each of several others.

Finally, among stones which pass in the trade as granites, but which have a very different chemical composition, the handsome dark-green dolerite of Rostrevor may be cited, which is often used for tombstones. The tough altered dolerite, or fine-grained diorite, of Arklow provides employment for 180 persons, being famous as a material for paving-sets.

In the foregoing sketch of the mineral resources and building

Conclusion.

stones of Ireland, many interesting materials may have been passed over, which may in time prove to have commercial importance.

But enough has been said to assure the reader that the popular notions as to the vast mineral wealth of Ireland, or her hidden coal-fields, waiting only for development, are myths unworthy of a serious and reflective age. If mining of metallic ores is to be established or revived in any district, it will only be possible through scientific enterprise, on carefully considered economic principles, and, above all, through the hard and continuous work of all concerned. It is possible, after all, that a ploughshare and a spade made of imported iron, and a home-bred peasant to guide them, may yet prove the best means of utilising the mineral wealth of Ireland, which ages of denudation have taught us to look for in the soil.

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THE SOILS OF IRELAND.

Through the writings of Boate, M'Culloch, Young, Wakefield, Kane, Griffith, and other acknowledged authorities on matters concerning land, agricultural enquirers are familiar with much that has to be said upon the present subject. The fertility of Irish soils has long been recognised—as a general characteristic, perhaps, sometimes over-estimated. It is probable that the favourable reputation they possess is largely due to the humidity of our climate—which imparts to the vegetation of the Emerald Isle its proverbial verdure—as well as to the circumstances which are to be described.

Situated as Ireland is, upon the outskirts of the European Continent, and exposed to the moisture-laden breezes directly reaching it from the Atlantic, the island in some respects suffers from, if in other respects it profits by, the undiminished effects of their humidity. Frequent late Springs and damp Harvests, with heavy rainfall, particularly in the hilly regions, causing waste of fertilizing ingredients in the soils, are amongst the evil effects attendant upon the position of the island. As a set-off against those drawbacks there are the modifying influences of the Gulf Stream, producing a more equable and milder climate than other countries in the same latitude enjoy. These circumstances are moreover conducive to a much prolonged period of vegetable growth, and to the rearing of healthy stock.

The following figures as to the aggregate areas of grass land and arable soil, woodlands, peat bogs, and waste land for 1899 and 1900, are taken from returns issued by the Statistics and Intelligence Branch of the Department of Agriculture and Technical Instruction for Ireland:—

PROVINCES.	Total Area under Crops (including Meadow and Clover).	Grass.	Fallow.	Woods and Plantations.	Turf Bog Marsh, Barren Mountain Land, Water, Roads, Fences, &c.	Total.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
LEINSTER. . . { 1899,	1,238,721	2,781,877	4,080	94,565	725,580	4,814,826
{ 1900,	1,239,835	2,777,666	3,302	95,019	729,233	
MUNSTER. . . { 1899,	1,182,884	3,223,676	2,858	103,967	1,365,985	5,919,260
{ 1900,	1,200,166	3,230,034	2,889	106,951	1,359,220	
ULSTER. . . { 1899,	1,583,856	2,404,165	4,335	57,425	1,272,563	5,322,334
{ 1900,	1,591,738	2,403,665	4,923	57,980	1,261,038	
CONNAUGHT. . { 1899,	622,061	2,095,394	1,813	52,548	1,445,068	4,216,924
{ 1900,	621,293	2,102,017	1,475	51,977	1,437,462	
TOTAL. . . { 1899,	4,627,545	10,675,012	13,086	308,495	4,808,206	20,333,344
{ 1900,	4,638,732	10,563,372	12,589	311,648	4,787,003	

Tabulated in another way, the distribution of areas runs thus:—

Above the 2,000 feet contour, 82 square miles; between 2,000 feet and 1,000 feet contour, 1,590 square miles; between 1,000 feet and 500 feet contour, 5,797 square miles; between 500 feet and 250 feet contour, 11,797 square miles; between 250 feet and sea level, 13,242 square miles.

It is thus seen that well-nigh half the area of Ireland would probably lie below the 300 feet contour line, and is thus favourably situated for the mechanical operations of farming, which become more laborious with the increase of declivities, while these, as well as unfavourable climatic circumstances, are dependent upon the increase of elevation.

Referring to the arable and grass land, there are several areas where high-class fattening pasturage prevails, such as the Golden Vein, on the confines of Tipperary, Limerick, and Cork; East Leinster, including parts of Meath, Dublin, and Kildare; and the Valley of the Lagan, including parts of Antrim, Down, and Armagh. Against this, there are many parts where the land is naturally poor, and where, because cultivated by the poorer classes of tenantry, it has, through bad tillage and over-cropping, run down below the condition which would be normal under circumstances of fair soil-treatment. Beyond these exceptional regions there is a large proportionate area of the country which presents a fairly high average quality of land, varied, however, by the intervention of peat expanses, badly drained clay tracts, and stony ground, which are of low value; and by alluvial flats, many of which show soils of good quality.

The varieties of land have been classified somewhat as follows:—

1. Finishing and fattening land. This land bears a thick sole of succulent grass interspersed with clovers.
2. Lowland pasture, first quality, suitable for dairying. This varies from land bearing mixed herbage to pasture on shallow, clayey, and moory soils.
3. Lowland pasture, second quality. Indifferently drained land, bearing rushy and coarse herbage.
4. Mountain pasture. Mixed green and shrubby pasture, with furze, heather, and rocky portions.
5. Wastes. Unreclaimed cutaway bog, red bog, and mountain top.

Throughout the country, in what is now pasture land, there are indications of the extensive tillage which it once could boast—a somewhat melancholy reminder of its lessened population, and of the correspondingly great drop in the prices of cereals and some other agricultural products. Even so late as 1870 the area under rotation crops, including clover, meadow, and fallow, was 5,659,796 acres; at present it is 4,640,354 acres. The unlevelled ridges or “lazy beds” to be met with in the grass land in many places, also remind one of the wasteful character of husbandry in vogue in the first part of the nineteenth century, when “beton” fires dissipated the organic matter of old leas, and with it the valuable store of nitrogenous compounds with which years of herbage-growth had enriched the sod. They were days of innocence as regards the wisdom of, rather, we

may say the necessity for, rigid conservation of the fertilizing ingredients in soils. It is now becoming better known that if burning renders mineral substances, particularly potash compounds in the sod, more easily soluble and available to plants, this, in the case of clay leas is at the expense of other beneficial ingredients: in the case of a plentiful depth of moory soil, the loss of organic matter, including nitrogen, is not felt. On the profit side of the soil account, it is doubtful if farmers yet fully realise the gain which would accrue



Specimens of Clover Plants; the larger plant exhibiting Root Warts.

from giving clovers and other leguminous crops a larger place in their rotations. It is now well known that such crops have the peculiar faculty of appropriating, through the agency of micro-organisms, which generally inhabit soils, and colonize in warts upon the roots of leguminous plants, free nitrogen, which exists in the atmosphere in unlimited quantities, and finds its way into the pores of the soil. The accompanying illustration* shows two clover plants:

* Reproduced from Salfeld's "*Bodenimpfung*," with the permission of Dr. Salfeld's publisher, M. Heinsius Nachfolger, of Leipzig.

one grown in soil devoid of micro-organisms, the other, of much larger size, under the same circumstances of cultivation, in soil to which micro-organic earth had been added. The latter exhibits the root-warts, which formed at once the abodes and laboratories of the microscopic beings.

The saving to the farmer's purse, in a lessened necessity for the purchase of nitrates and salts of ammonia, which would accrue from the cultivation of leguminous crops, is the best argument for his consideration of this touch of science.

Nor have Irish soils suffered only through the dissipation of nitrogenous compounds, for every barrel of wheat, barley, oats, and other cereal taken to the market, every load of hay and straw sold to be exported or utilized in and near towns, every animal driven off the land, every gallon of milk used elsewhere than on the farm, robs the soil of a proportion of lime, phosphate, potash, magnesia, and other mineral substance, so essential to the maintenance of fertility. It is a somewhat amazing fact that after centuries of such loss as must in the ways mentioned have been incurred, not to speak of the still greater waste, perhaps, through the drenching of soils in wet weather, and the carrying off by drainage, streams, and rivers, thousands of tons of the valuable substances mentioned, that the soils of this country should have retained any reputation for fertility. The source of waste last referred to is so great, even in France—a much drier country than Ireland—that M. Risler,* in his *Géologie Agricole*, while enforcing his advice as to the necessity for irrigation, gave it as his opinion that, if this were adequately practised, the wealth of the country would be *doubled*. So great is the drain upon the phosphates, particularly, it may be said, in the store-cattle feeding portions of Ireland, that Sir R. Kane questioned whether the store of these valuable substances would not, sooner or later, become exhausted. There is no doubt that this would be the case, were it not that the soils become renovated by fresh supplies from beneath, in the case of land where, as over much of the limestone area, the necessity for artificial supplies is not greatly felt, though the soils are often shallow.

A glance at a geological map of Ireland will show that about half its area is formed of *limestone*; and it is well known that soils derived from this rock are proverbially rich. They contain, besides lime, a proportion of phosphates; but unless the limestone detritus contains a large proportion of clay it is poor in potash-yielding minerals. Other rocks, also, though not limestone, are calcareous, such as the red marls of North-east Ireland, calcareous grits and slate of the Silurian formation, parts of the Old Red Sandstone, and basic igneous rocks—basalts, &c. These yield a proportion of lime to soils formed therefrom, phosphate also, probably, in small quantities, but in forms not easily available to plants. Acid igneous rocks, viz., granites, felsites, &c., yield potash to their soils, and clays derived from most of the formations contain a proportion of this fertilizer.

The supervention of glacial conditions in this country, in the Ice-age, has resulted in transplacements, to a greater or less extent, of soil-forming materials, so that only the soils found in the elevated tracts, are such as could be produced by the disintegration of the rock immediately underlying them. These circumstances, though in some instances operating adversely, are found in a far greater degree to

* Director of the *Institut Agronomique*, Paris.

have worked beneficially to the agricultural interest; for the distribution of drifts, proceeding chiefly from the central plain, has covered hundreds of square miles with valuable limestone detritus, thus imparting to hundreds of thousands of acres, over other rock formations, a degree of fertility which otherwise they would not possess.

The distribution of drifts may be judged from the accompanying small map, prepared with a view to showing the ground covered with those deposits—not all limestone detritus, however. The materials and mixtures are well-nigh infinite in variety; to represent even a fair classification of them and of soils formed from them, as well as directly from the solid rock, where no drifted materials occur, would demand a large scale detailed map. In the production of such a map for agricultural purposes, while noting in a general way the local nature of the drifts, especially as regards sub-soils, I think a double system of classification could be adopted, with appropriate colouring and other map indications, in which, as regards texture, sands and gravels, brick clays, and the intermediate varieties, sandy loams, loams, and clay loams, would be noted; and, as regards chemical resources, distinctions would be indicated between lime soils, highly calcareous and non-calcareous soils, and those strongly potassic. The former or *physical* distinctions, might be indicated respectively by the following letters, viz.:—*s* (sands and gravels); *cl* (brick clays); *ls, l, lc* (the principal varieties of loam). Tabulated, the chemical indications, also, might appear as follows:—

CLASSIFICATION OF SOILS ACCORDING TO THEIR CHEMICAL PROPERTIES.

Distinction.	Symbol.	Description and Origin.
<i>Lime Soils,</i> ...	C ^a .	Those obviously formed from limestone drift and shallow soils resting on limestone. They will probably contain a quantity of phosphate in easily available form for plants.
<i>Highly calcareous,</i> ...	C ₂ .	Drift soils derived from calcareous rocks, where limestone detritus is noticeable in the subsoil; and soils formed directly from disintegrating basic igneous rocks. They will probably contain some phosphate.
<i>Calcareous,</i> ...	C ₁ .	Those derived from calcareous rocks, and drift soils in cases where the deeper subsoils graduate downward into limestone boulder clays and gravels. Phosphates, if present here, probably occur in forms not readily available to plants.
<i>Non-calcareous,</i> ...	C ₀ .	Those derived from non-calcareous rocks.
<i>Potassic Soils,</i> ...	K.	Soils derived from acid igneous rocks—granite, felsite, &c.

Such a classification as this would place experiments in manuring upon a sound, because scientific basis; for it will be apparent to any thoughtful person that the results obtained from the use of certain

manures upon soils—say, of the first and fourth kinds named above—must necessarily differ; and that without a recognition of the distinctions pointed out, the results should prove misleading and worthless as a means of testing or illustrating the comparative worth of manures. The results obtained may just as well prove the differences of soils in different places, as the different degrees of suitability of various schemes of manuring to certain crops. It may be conceded that crops do not all draw alike upon the chemical constituents of soils—upon this fact partly the principle of rotation cropping depends—and that certain artificial supplies are suggested by the special requirements of particular crops. It is, nevertheless, rational to suppose that the deficiencies and natural resources of soils are amongst the chief points to be considered in prescribing and adopting suitable manures. To render this possible some such classification as that above proposed, and soil maps prepared accordingly, would seem to be necessary economic desiderata.

Amongst the uses to which such maps might with advantage be put are the following:—

It has been found that certain parts of Ireland, determined by geological circumstances yield a superior quality of butter, as compared with other parts—circumstances of manufacture being equal;* more concentration of effort, therefore, upon dairying in such localities, as indicated by soil maps, would obviously be attended with good results as regards this branch of the industry.

Pastures clothing soils rich in phosphates are best adapted to horse-breeding, where strength of bone and constitution are especially demanded; the necessity for a good supply of lime and phosphate is also requisite in the rearing of young stock. Soil, therefore, naturally rich in these ingredients would be especially suitable to these branches.

A good supply of potash in soils is necessary for the growth of the best samples of malting barley, and generally in promoting maturity in cereals. Means of selecting the most suitable localities for the former crop, and indicating the deficiencies in soils, where the crop is grown, would, therefore, be of obvious value to farmers.

Another obvious advantage which soil maps would afford, would be guidance as to the most economic and, therefore, profitable application of artificial manures. Some £300,000 worth of mineral manures is employed in Ireland; such are used with substantial profit in many cases, but with recorded loss in others—to the extent, sometimes, of £2 an acre. These facts serve to emphasise the advantage claimed.

It has been fully established by experiments conducted at Rothamsted, that the influence of certain mineral substances in soils, upon the character of vegetation and quantity of produce borne is very marked; it is not enough, therefore, to know whether the soils are loams, clay loams, or sandy loams, &c. Geological circumstances determine these latter points, which may be discerned by any one: they also determine in a fairly accurate way the chemical resources of the soils, which are not so manifest to ordinary observers, but which may with advantage be studied, in connection with the quantity and quality of herbage land produces, and may be made to produce.

* See article in *Farmers' Gazette*, issue of 10th December, 1898, and editorial comments in issues of 17th December and 14th January following.

Of the large areas of peat and moory soils met with throughout Ireland, much might profitably be reclaimed. Reclamation undertaken on an extended scale has occasionally been attempted, with discouraging results. On the margins of peat bogs, however, where the transference of clay and gravel for top-dressing would not be costly, and lime is easily procurable, it has been successfully carried out, and "cut-away" bogs in many places could easily be brought under profitable cultivation. Limestone gravel and clayey drifts would be especially suitable for the purposes; disintegrating granite has been used effectively in North-west Donegal, and the detritus of Old Red Sandstone in the region of Dunmanway, in Cork.

Shell gravel and "coralline sand" exist at various points along the coast of Ireland, and these substances would be invaluable in reclamation.



Hazlewood, Lough Gill, Co. Sligo.

THE CLIMATE OF IRELAND.

All who are concerned in the material interests of Ireland realize what an important place considerations as to climate hold in connection with the prosperity of the country. No class can appreciate better than agriculturists, the manner in which their industry is affected by the characteristic features of our climate ;—to wit, fickleness and unusual humidity, with a degree of mildness in temperature, which surpasses that of other countries of the same latitude. Taken in conjunction, these characteristics are not unfavourable to health, and are particularly suited to the stock-feeding branches of our main industry. Crop raising, particularly in the case of cereals, is affected by both humidity and the frequency of weather changes ; notwithstanding this, a high degree of success in cultivation was realized before prices were brought down to their present level ; and the climate did not hinder the successful growth of wheat, though, perhaps, this is the crop which is most sensitive to its unfavourable influences.

There can be little doubt that the clearing away of forests, the lessening of water areas, and the carrying out of extensive schemes of arterial drainage, in the first half of the last century, have tended to bring about changes in the climatic conditions. These have been, probably, more in the way of greater drought and increased light and heat in summer, and greater cold in winter, than in the alteration of the mean annual temperature of the island : but, even if alteration in the former respects have taken place, it must have been to a very slight degree, as it would be over-ridden by the effects of much stronger outside influences, which no changes within would affect, and which have operated uniformly, probably, for many centuries. One great disadvantage attendant upon the clearing of forests is the lack of shelter which they would afford, an element of no mean importance where stock feeding in the open is so much practised as it is in Ireland.

We may, at the outset, distinguish between *climate* and *weather*. The former is chiefly dependent upon the geographical position of our island with reference to latitude, and, relatively, to the neighbouring Continent of Europe, as well as in a less degree, upon the altitude of its mountain groups. The weather, on the other hand, depends upon the seasons and the changeability of the wind direction, or, in more scientific language, the movements of aerial currents. It is impossible to draw a hard-and-fast line between conditions which constitute climate, and those which constitute weather, they are both dependent upon natural laws which mutually interact ; and these may be briefly reviewed here in so far as they affect Ireland, under the following heads, viz. :—

Temperature.

Latitude

The Gulf Stream.

Configuration of the ground.

Aspect.

Relation of temperatures of air and soil.

Aërial currents.

Atmospheric moisture.
 Vapour condensation.
 Cloud, fog, dew, mist, rain.
 Wet and dry winds.
 Rainfall.
 Weather prognostication.

TEMPERATURE.

Every reader is likely to be aware of the manner in which the temperature of Ireland is affected by its position as regards *latitude*. It will guard against exaggerated estimates of the extent to which the local temperatures of the north and south of the country differ, to say that while 3,700 miles intervene between the Torrid and Arctic zones, the length of this island is only 270 miles, or one-fourteenth of the former distance.

Latitude. A potent factor in favourably influencing the climate of Ireland, as well as in modifying the differences of temperatures

The Gulf Stream. locally experienced, is the Gulf Stream. This vast body of water, issuing from the Gulf of Mexico, flows north-eastward past Florida into the North Atlantic Ocean.

It continues its course across the Ocean, with an average temperature of 65° F.,* dividing into two branches, a north-easterly, which flows past the British Isles, and an eastward branch flowing towards the coasts of France. Parts of both branches strikes the S.W. coast of Ireland and flow northward, and part of the eastern branch, turning northward in the Bay of Biscay, flows up the English and St. George's Channels, and towards the Irish coast. The heating effect upon the British Isles is such that the mean winter temperature of Ireland is 20° F. higher than that of places on the same parallels of latitude in America and West Russia. The body of water, also, is so great and so uniform in temperature that the mean summer temperature of Ireland is some 5° F. to 10° F. lower than that of East Prussia. The amount of caloric which the Gulf Stream possesses, and can impart to the atmosphere in our latitudes, may be inferred from the following note given by Marié Davy,† which may be taken as an average instance for the latitude named, viz. :—

On the 11th of November, at 8 p.m., the temperature of the sea was 15° (59° F.), and that of the air 4° (39·2° F.) in latitude 40° 25' N., a difference of 19·8° F.

The effect upon the local temperatures in Ireland is such, that the isothermals crossing the island, decline from the parallels of latitude, so that the mean temperature at Dublin for the year is 1·7° less than at Westport. For January it is 3·3° less, while, for August, the mean temperature of Dublin is 1·1° *higher*, than that at Westport.

The combined effect of latitude, and of heating due to the Gulf Stream—comparing the north with the south of the country—is about 4° for January, 2·5° to 3° for August, and 3·3° for the year, in favour of the south.

* "Meteorology, Practical and Applied" (p. 314), by J. W. Moore, M.D., now Sir J. W. Moore.

† "Météorologie Générale," p. 145.

Amongst the conditions contributory to the general character of the climate of the island, as well as to variation in local temperature, is the configuration of the surface. If 300 feet above the sea level be taken as the general level of the lower parts of the country about half its area lies above this elevation, and every additional 100 feet above 300 perceptibly lessens the value of land, because of the effect of altitude upon temperature. This was fully recognized by Sir R. Griffith. In consequence of the effect referred to, the mean temperature at 500 feet elevation near Dublin, would be about equal to that at the sea level at Londonderry or Moville. The temperature falls approximately one degree F. for every 250 feet rise in our latitude. The higher ground of the mountain groups, moreover, tends to modify the direction and force of winds; it produces condensation of vapour reaching Ireland from the Ocean, which greatly affects the temperature of the hilly regions, and adjacent low-lying areas; and it partially drains the aerial currents of moisture, so that the precipitation (rain) on the lee side of the hills, is not so great as it otherwise would be.

Configuration of the Ground.

Every farmer knows the advantage of a southern aspect for his early seed bed in spring. The sun at the Equinox is only some 36° above the horizon at noon in our latitude. Its heating power at this season therefore, as well as being lessened by sending its rays obliquely through the moist atmosphere, is greatly diffused on level surfaces, and almost *nil* on northern slopes. Concentration of the sun's heat and light therefore, which is so desirable, can only be secured by arranging that beds bearing seeds and plants shall be presented to it at as great an angle as convenient.

Aspect.

Badly drained land and retentive geological Formations have not only a cooling effect on the air in immediate contact with them, but through the diffusion of the chilliness have a material effect upon the island as a whole. This is a subject which may well repay full consideration; for the circumstances of cause and effect act and react. A damp atmosphere hinders the heating effects of the sun upon the land; and damp cold soils and rock Formations, on the other hand, cause dampness of the atmosphere.

Relations of temperatures of air and soil.

Wollny proved abundantly by an elaborate series of experiments carried out at Munich in 1890, 1892 and 1893 that top-dressing peat soil, not to speak of the well-known advantage of thorough drainage, had the effect of raising its temperature, particularly when the top-dressing was *mingled* with the uppermost layer of peat; and this both in upland moor soils (*Hochmoorboden*) and lowland (*Niederungsmoorboden*).*

Many elements combine to produce variation in the direction and pressure of winds in the Irish region. Amongst

Aerial Currents.

them may be reckoned land and sea breezes experienced evening and morning under certain circumstances; and "Anti-trade winds" which are S.W. and W.S.W. winds prevalent in our latitudes† (Trade winds prevailing between 9° and 30° N.—Buchan's Meteorology, p. 132). The most influential factors in causing variation in wind direction and general disturbance are the cyclonic storms which reach Europe from the Atlantic, sometimes in

* *Forschungen a. d. Geb. d. Agrikulturphysik*, for 1894, pp. 245 et seq.

† According to Dr. Buchan. More modern opinion ascribes S.W. and W.S.W. winds to cyclonic causes.

comparatively rapid succession. The origin of these storms is a subject of much debate upon which we need not enter. They are by many believed to cross the Atlantic from shore to shore. Prof. Loomis, an able authority, maintains that they undergo modification after leaving the American coast region, which of course interferes somewhat with calculations as to the time and place at which they may reach Europe.* The popular belief is that these points may be accurately foretold; and it is worth noting that calculations in this respect are frequently verified.

It is however, a generally accepted fact, by Mr. Scott, as well as others, that after traversing a great distance across the Atlantic, these storms usually reach the European region a little to north of the British Isles, Ireland experiencing brushes of the skirts of the vast aerial eddies in their easterly progress. Occasionally they cross the British area, and cause a greater amount of meteorological disturbance than usual. A peculiarity of these circular storms is that they rotate, if looked at downward, in a direction contrary to the hands of a watch, north of the Equator. The centres are marked by reduced barometric readings, the pressure of the atmosphere being there particularly low; and the pressure increases outward towards the margins of the eddies, where it is approximately normal. As the storm passes over a locality therefore, the barometer rapidly falls till the place is reached by the centre of the cyclone, after which the barometer rises. And, as regard wind directions experienced while the storm moves onward, if the centre passes to the north of Ireland, in the way most usual, the direction of the wind will be perhaps first S., then S.W., then W.—the change, or *veering* as it is called, being “with the sun.” If it take a more southerly course and crosses Ireland, the winds will change “against the sun,” *backing*, as it is called, with a falling barometer, a condition which will be followed by a repetition of the storm, and a rising barometer.

By carefully mapping simultaneous barometric observations at many places and connecting the places of equal indicated atmospheric pressure over large areas, the connecting lines (*isobars* as they are called), form irregular concentric circles around the centres of the cyclones, and by comparing the positions of these circles from day to day, or more frequently, the progress of the storm may be made apparent by means of maps. There are also circles, obtainable in a similar way, surrounding points on these weather charts where the barometer stands very high. These points are the centres of “anticyclonic systems,” around which winds circulate at rates not at all so rapid, and in an opposite direction to that uniformly observed in cyclones; the anticyclone circulates according to the hands of a watch.

From these circumstances it will be seen that winds in the Irish region may well greatly vary both in direction and force. Dr. Lloyd, in his report on the Meteorology of Ireland,† has given a Table setting forth the directions of wind, which shows that westerly winds are on the whole more than twice as prevalent as easterly, throughout the year; that the most prevalent are those from the S.W., W., and N.W.; that the least prevalent are east winds, and that south winds are the most prevalent after the westerly.

* The subject is discussed in a most interesting manner by M. Marié Davy in his *Météorologie Générale*, pp. 223 to 234. Mr. R. H. Scott, F.R.S., treats the matter as one of doctors differing, and perhaps wisely confines himself in his work on “Weather Charts and Storm Warnings” to the simple questions of their existence, movements, effects and characteristics.

† Transactions of the Royal Irish Academy. Vol. xxii., pp. 440-442.

**Atmospheric
Moisture.**

Air takes up moisture at all temperatures, and becomes highly charged when moving over sheets of water, marshes, and peat bogs. It is, however, seldom charged to the full extent that it will bear—it is seldom *saturated*. The less moisture it contains, the greater its drying power, or hygroscopic capacity, and the less is its “relative humidity.” This term, given in Meteorological Tables, may be explained as the percentage of vapour in the air to that which is necessary for its saturation. The greater the relative humidity the better it is for agriculturists at times when, as in May and June, in Ireland, herbage is likely to suffer from drought through lack of disturbance in atmospheric conditions, such as is usually attended by rain. The average relative humidity, for the year, reckoned upon monthly averages for sixteen Irish Stations, as given by Dr. Lloyd, was as high as 87 per cent. for the year 1851.

At night when the air cools down—through contact with the earth, itself cooled by radiation—a temperature is reached at which the air can no longer retain its vapour in invisible form (for the warmer air is, the greater is its capacity for vapour); the vapour then condenses and becomes visible as fog which rests on vegetation and soil as dew, or in extreme cases as hoar frost. The temperature at which fog begins to form is called the *dew point*, also given in Meteorological Tables. At the dew-point the condensation of vapour causes a release of latent heat, which tends to preserve the layer of air in contact with vegetation from extreme cooling—an important consideration in early spring. We may say then that the higher the dew point is, the less likelihood is there of injury from frost. These circumstances exhibit the utility of Meteorological Tables for Irish farming.

Happily the lowland parts of Ireland are not so cold as commonly to produce vapour condensation; but this often **Fog, Cloud, Mist, Rain.** takes place around the colder mountain-tops and along the flanks of hills; and affords a familiar index of humidity and forewarning of probable mist and rain. The fogs which hang about such situations have a baneful influence upon the agriculture of hilly districts. They hinder the passage of the sun's light and heat which otherwise would counteract the cooling effects of air descending from the hillsides into the valleys, and to the land margining the hills; with the results of late springs, late and damp harvests and other disadvantages.

The meeting of currents of air in the higher regions of the atmosphere, one cold and probably dry, the other warm and damp, will, when they coalesce, if the latter be sufficiently humid, result in the condensation of the contained moisture, which will form cloud and possibly rain. The currents, too, before meeting may contain sufficient clouds to indicate their directions, and render it possible to forecast the result.

Sir J. W. Moore, M.D., &c, has given, in his work on Meteorology (p. 221), an excellent classification of clouds, to which attention is here directed. Some accompany *fine*, and some *bad* weather.

Amongst the former are—*Cirrus* or “mare's tail;” *Alto-cumulus*; *Cumulus* or “wool-pack;” and amongst the latter are *Cirro-stratus* or “sheet cloud;” *Alto-stratus* or “ground fog;” and *Cumulo-nimbus* or “rain cloud.” The altitudes of clouds range from about 9,000

metres (nearly 10,000 yards in the case of Cirrus) to some 2,000 yards in the case of "fog banks."

The insular position of Ireland exposes it in a special way to the influence of damp winds off the ocean, the prevalent ones in this region, as we have seen, being those from the westward and southward. Those from the north and east, though not always dry winds, are usually so.

Symons' Tables of British Rainfall supply a tolerably full record of that which obtains in Ireland. A comparison

Rainfall.

of the records from different places enables us to separate those with a large average rainfall from others; in this way we perceive that the highest records attach to the hilly districts margining the Irish coast on the west, south, and east sides. The line which divides this wettest region from that which is drier passes approximately through the towns of Londonderry, Enniskillen, Boyle, Loughrea, Limerick, Tipperary, Kilkenny, Dublin. The averages for the wet district were 43·56 inches in 1879, and 36·36 inches in 1896, and for the central plain 34·39 inches in 1879, and 34·07 inches in 1896. The altitude of the point of observation affects the results very materially, giving an increased rainfall, and with it an impoverishment of soils by drenchings. As compared with England, the least average rainfall in any part of Ireland is greater than that of south-east England; but that of Cumberland and parts of Wales is greater than any in Ireland.

With such a degree of variability in the weather as is experienced in Ireland, a system of prognostication, such

Weather Prognostication.

as can be adopted and applied in America, would be invaluable; but what has already come before the reader will show how different are the conditions of the problem in the two countries. In America, with its immense continental area, storms may arise, run their course, and cease, within the region reached by the splendid system of telegraphic communication organized by the States Agricultural Department. In Ireland, on the other hand, the disturbing forces originate in, and approach these islands mostly from the west. Hence, one is prepared to hear so high an authority as Mr. R. H. Scott, late Secretary of the Meteorological Office in London, confess that weather prognostication in this country is attended with prodigious difficulties. There is no doubt, however, that patient, steady, and systematic use of the barometer and thermometer, with close observation of such phenomena as the forms and movements of clouds, would reward those whose care it is to combat or forestall the unfavourable weather conditions which assail us. If these observations were supplemented by some others collected, say, at a few stations along the western seaboard, used conjointly with information received from many quarters at the Meteorological Office in London, put in suitable form for transmission at a subsidiary office in Dublin, and despatched by wire to country parts, there is little doubt that material help could by such means be given to farmers in the harvest season. The help would be especially valuable in barley growing districts. This crop, an important asset in the country, is particularly liable to injury by bad harvesting; and even ten or twelve hours of warning would admit of the reaped crop being secured against danger.

I shall conclude this article by giving the substance of what

R. H. Scott says (Weather Charts and Storm Warnings, p. 61) concerning the approach and characteristics of cyclonic storm, regarded in their simplest elements.

The phenomena belonging to the front of the system are—*Cirrus* clouds or "mare's tails" in the sky, south-easterly winds, great rise of the *thermometer*, and excessive dampness. The sky becomes gradually overcast, followed by mist and rain. The *barometer* falls persistently, while "scud" begins to drift from the southward. The barometer continues to fall, the wind *veering* from S. to S.W., rain falling. As soon as the wind passes the S.W., and draws to W. or N.W., the *barome'er* begins to rise with a sudden jump, and the temperature falls, with very heavy showers of rain, possibly turning to hail, connected with and following which the air becomes drier and the sky clears.



Ballynahinch, Co. Galway.

THE FLORA OF IRELAND.

To a British botanist nothing can be more enjoyable than his first view of the typical Irish plants to be found in Connemara, in counties Kerry, Cork, or Donegal. With the salmon-smugglers' friend, the beautiful Irish Spurge, in profusion along the coast, the royal fern-forming hedges on the earth banks dividing fields, every pool, it may be, containing *Lobelia Dortmanni*, the Pipewort, with possibilities of the Quill-wort and the Pill-wort, the botanist may search for *Najas flexilis*, rare heaths, Saxifrages, the filmy ferns, orchids, or other characteristic rarities. Fortunately, he may go well armed with the recently published second edition of the *Cybele Hibernica*, which gives a general account of the distribution of Irish flowering plants and ferns, and embodies the work of the authors of the first edition, the late Dr. D. Moore and A. G. More; of the editors of the second edition, N. Colgan and R. W. Scully; and of the late Professors C. C. Babington, J. H. Balfour; J. T. Mackey, W. Wade, I. Carroll; of S. A. Stewart, T. Chandlee, R. M. Barrington, R. Ll. Praeger, H. C. Hart, R. A. Phillips, and many others.

The Introduction to the *Cybele Hibernica* contains a discussion of the chief features of the Irish flowering plants, and of the physical causes combining to produce these features. Just as the English Flora (1,420 species), may be regarded as an incomplete Continental one, so may the Irish Phanerogamic Flora (1,000 species), be considered as an incomplete English one. The Irish Flora consists largely of English migrants, and would have been still more English in character had not Ireland incontinently separated itself by the sinking of the difference (in land) between itself and Ireland in the Irish Sea. Owing to the warm moisture laden, south-western winds, the sedges, rushes, ferns, &c., are more abundant in the west, to which region *Silthoropia europæa*, *Microcala filiformis*, and *Saxifraga Geum* are confined. A few species found in the west and south-west are true Hibernians, being absent from Great Britain, and include the London Pride, the Strawberry tree, and several fine heaths in Connemara. This distribution is brought out in an accompanying map, showing the twelve well-known districts into which Ireland has been botanically divided.

The mosses and liverworts found in Ireland are of considerable interest. The late Dr. D. Moore contributed to the Proceedings of the Royal Irish Academy distributional lists of the two groups, and since his time the Rev. C. H. Waddell, B.D., in mosses, and D. M'Ardle in liverworts, have added largely to our knowledge. The brothers Groves have published in the *Irish Naturalist* a list of the Characeæ found in Ireland. The work of the late W. Archer, F.R.S., in fresh-water algæ, and of the late Rev. H. O'Meara in Diatoms, was published in the *Quarterly Journal of Microscopical Science, Natural History Review*, &c.

The *Phycologia Britannica* of the late W. H. Harvey, the Professor of Botany to the Royal Dublin Society (a chair now continued in the Royal College of Science, Dublin), and in Trinity College, Dublin, is still the standard work in English on British Marine Algæ. The writer, with the help of former students, has added to the list of Irish Marine Algæ; but there is still an enormous amount to be done before the

knowledge of the distribution of Irish weeds can be regarded as at all commensurate with that of the weeds of the English or Scotch coasts. There are many points on the Irish coast where British algologists may spend a profitable holiday. What is stated of the Irish algæ is still more applicable to the fungi. The names of Greenwood Pim, Dr. E. J. M'Weeney, and Rev. H. W. Lett exhaust the list of Irish fungologists. The counties chiefly examined are those of Dublin and Wicklow, and even in these, in one week, the British Mycological Society added 150 to the known list. The lichens have been practically untouched since the death of Admiral Jones, whose large collection is preserved in the Herbarium of the Science and Art Museum, Dublin.

It must be a matter of surprise that so much excellent work has been done when it is remembered that Botany has hitherto received no encouragement either in the elementary schools or in the boys' secondary (or intermediate) schools of the country, and that in the girls' secondary schools it has been treated as a polite accomplishment, largely taught and altogether examined theoretically.



Enniskerry, Co. Wicklow, with view of the Sugar Loaf Mountain.

THE ANIMALS OF IRELAND.

The extreme western outpost of the great Euro-Asiatic continent, Ireland possesses a fauna that, although comparatively poor, is highly interesting. Ireland is doubtless a "continental island," which at no very distant geological period formed part of a far-stretching land-mass,* and its animal inhabitants must, for the most part, have made their way thither over land-connections now submerged beneath the waters of the sea. Situated far to the west, the island is poor in species as compared with Great Britain, and still poorer as compared with continental Europe. Most of the Irish animals are identical with British species; but many creatures that are familiar to the English naturalist are absent from Ireland. On the other hand, many ancient forms of life, unknown or restricted to very narrow limits in Great Britain and the nearer parts of the Continent, have been preserved in Ireland, and it is the presence of these that makes the fauna of the country so interesting a study. One well-marked group, which shows a likeness to the inhabitants of Scandinavia and the Arctic regions, may be characterised as the Northern or "Arctic Fauna." Another group, showing affinity to the denizens of south-western Europe and the Mediterranean shores, is often distinguished as the "Lusitanian Fauna."

VERTEBRATES.

The best-known class of animals—the Mammals—yield good illustration of the poverty and the interest of the Irish fauna. Several familiar beasts—the Fox, the Badger, and the Otter, for example—occur throughout the country, as in Great Britain. But of the order—the Carnivores—to which these belong, the Weasel and Polecat are unknown in Ireland, although the Stoat is common, and of some interest, since its Irish race differs constantly from the British in the relative extent of its dark and pale markings. Wolves formerly abounded in Ireland, where they were not exterminated until the eighteenth century. The former presence of Bears in the country is shown by the discovery of their remains in cave-deposits, but they seem to have become extinct before the historic period. The Irish Bear appears to have resembled closely the Grizzly (*Ursus horribilis*) of North America; no remains of the great Cave Bear (*Ursus spelæus*) that inhabited Great Britain and Central Europe during Pleistocene times have been found in Ireland.

Turning to the Insectivores we find the Hedgehog common everywhere as in Great Britain, while the Mole is quite absent, and only one Shrew, the "Lesser" (*Sorex pygmaeus*) out of the three British species occurs. Similarly, Ireland has but seven of the fifteen British Bats. Of the two surviving British species of Deer—the Red Deer and the Roebuck—Ireland has only the former, now

* A. R. Wallace. "Island Life." London, 1869.

confined to protected areas in Cos. Kerry and Wexford. But the Reindeer formerly inhabited the country, and the remains of the extinct Giant Deer (*Cervus giganteus*) occur so abundantly in the marls beneath the Irish peat-bogs that the animal is commonly known as the "Irish Elk," though its remains, as preserved on the Continent, in Great Britain, and in the Isle of Man, show that it must have travelled westward from southern Europe or western Asia. The only species of Elephant known to have inhabited Ireland in former times is the Mammoth, whose bones have been found in the Co. Waterford cave deposits.

Among the Rodents both the Black and Brown Rats occur, and a dark, fine-coated variety of the latter species was described by Thompson as distinct, under the name of *Mus hibernicus*. But Ireland possess only two of the four British Mice, and not a solitary representative of the Voles. The Irish Hare is not the familiar animal (*Lepus europæus*) of the British lowlands, but the Varying Hare (*L. variabilis*) of the Scottish highlands, which, on the Continent, is confined to northern and Alpine regions. In Ireland this animal—a typical example of the Arctic Fauna—occurs both on the hills and in the plain; owing to the mild climate, it only occasionally assumes the white winter coat so appropriate in those northern and mountain haunts to which (except in Ireland) it is now restricted by the competition of its newer rival.

The absence of so many British Mammals shows, without doubt, that the land-connections between Ireland and Great Britain must have broken down before the latter country became separated from the Continent. Ireland is, therefore, the older of the two islands. Dr. Scharff* has recently shown that those British Mammals ("Eastern" or "Siberian" fauna) absent from Ireland migrated from Siberia across the Central European plain in Pleistocene times, reaching Great Britain too late to continue their progress farther to the west. It is remarkable that (excepting only the Grizzly Bear) all the living and extinct Mammals of Ireland inhabit, or did inhabit, Scotland. This fact led Professor Leith Adams† to infer that they entered Ireland by a northern land-connection. But Dr. Scharff believes that—except in the case of the Reindeer and the Varying Hare, evidently northern species—the track of all these animals can be traced by their fossil remains westward through southern Europe. He concludes, therefore, that they entered Ireland from the south and passed thence northwards into Scotland. We see, therefore, how the peculiarities of the Irish fauna bear on fascinating problems of ancient geography.

Ireland affords an excellent field for the study of many Birds that are restricted as breeding species to the more remote parts of Great Britain. The Ring Ouzel and the Dipper, for example, breed in suitable localities throughout Ireland, while the Raven and the Chough still nest in most of the western counties, the latter bird being often found in numbers along the sea-cliffs. The unpopular Hooded Crow is widespread and common, but the Carrion Crow is almost unknown.

Among birds of prey, the Golden Eagle still lingers as a breeding species in the remoter parts of Cos. Mayo and Donegal, while the

* R. F. Scharff. "The History of the European Fauna." London, 1899.

† A. L. Adams. "Report on the History of Irish Fossil Mammals." *Proc. R.I.A.* (2), iii., 1878.

Peregrine Falcon nests on sea-cliffs and mountains throughout the country. The rocky coasts of Ireland afford numerous breeding places for sea-birds; Black-headed Gulls nest in large colonies on the midland bogs.

As among the Mammals, several familiar English species—the Nightingale, the Reed-warbler, and the Tawny Owl, for example—are quite unknown in Ireland. On the other hand, several birds are extending their range as breeding-species through the country, as the Stock-dove, the Tree-creeper, and the Crossbill. The Magpie, now common throughout Ireland, furnishes an excellent example of the rapid spread of a modern immigrant, as the bird is known to have invaded the country so recently as 1684, when a small flock landed in Co. Wexford. A very interesting example of the southern range in Ireland of a typically northern animal is furnished by the Red-breasted Merganser, which nests in many counties, including Kerry, although its breeding-range in Great Britain is confined to Scotland, and on the Continent to northern and Arctic localities. Recent discoveries by Messrs. Ussher* and Knowles of remains of the Great Auk† in kitchen middens on the Antrim and Waterford coasts prove that this interesting northern bird ranged farther south in Ireland than elsewhere in Europe, and was used as food by pre-historic man.

Much valuable information obtained from birds observed at light-houses and lightships around the Irish coasts has been recently collected by Mr. Barrington, who has been able to throw considerable light on the paths taken by the various species on their migrations.‡

The only Reptile native in Ireland is the Brown Lizard (*Lacerta vivipara*) which is locally spread over the

Reptiles and Amphibians.

country. The absence of snakes from the island is well known, and is doubtless due

to the same cause as the absence of the Eastern group of mammals described above. Of the Amphibians, the Common Frog is abundant and widespread, though according to tradition it is an introduced animal; and only a single species (*Molge vulgaris*) of the three British Newts is known to inhabit Ireland. The most interesting Irish Amphibian is the Natterjack Toad, which is confined to a small area in Co. Kerry along the shores of Dingle Bay. It is doubtless a member of the old Lusitanian fauna, as it is abundant in south-western Europe, but very scarce and local in southern Britain and Central Europe.

Attention may be called to two features of the Irish fish-fauna.

Fishes.

Beyond the hundred-fathom line off the west coast several deep-sea fishes have been dredged which are, of course, unknown in the shallow channels between Ireland and England, or England and the Continent. This deep-sea fauna off the western Irish coast shows a remarkable mingling of northern and southern forms. Arctic and Scandinavian species like *Marrurus rupestris*, and the Portuguese deep-sea shark *Centrophorus squamosus*, occur together off the coast of Co. Mayo.§

The other point of interest is furnished by the Irish freshwater

* R. J. Ussher and R. Warren. "The Birds of Ireland." London, 1900. A. G. More. "A List of Irish Birds." Dublin, 1890.

† See illustration on next page.

‡ R. M. Barrington. "The Migration of Birds as observed at Irish Lighthouses and Lightships." London and Dublin, 1900.

§ E. W. L. Holt and W. L. Calderwood. "Survey of Fishing Grounds, West Coast of Ireland. Report on the Rarer Fishes." *Trans. R. Dub. Soc.* (2). v., no. ix., 1896.

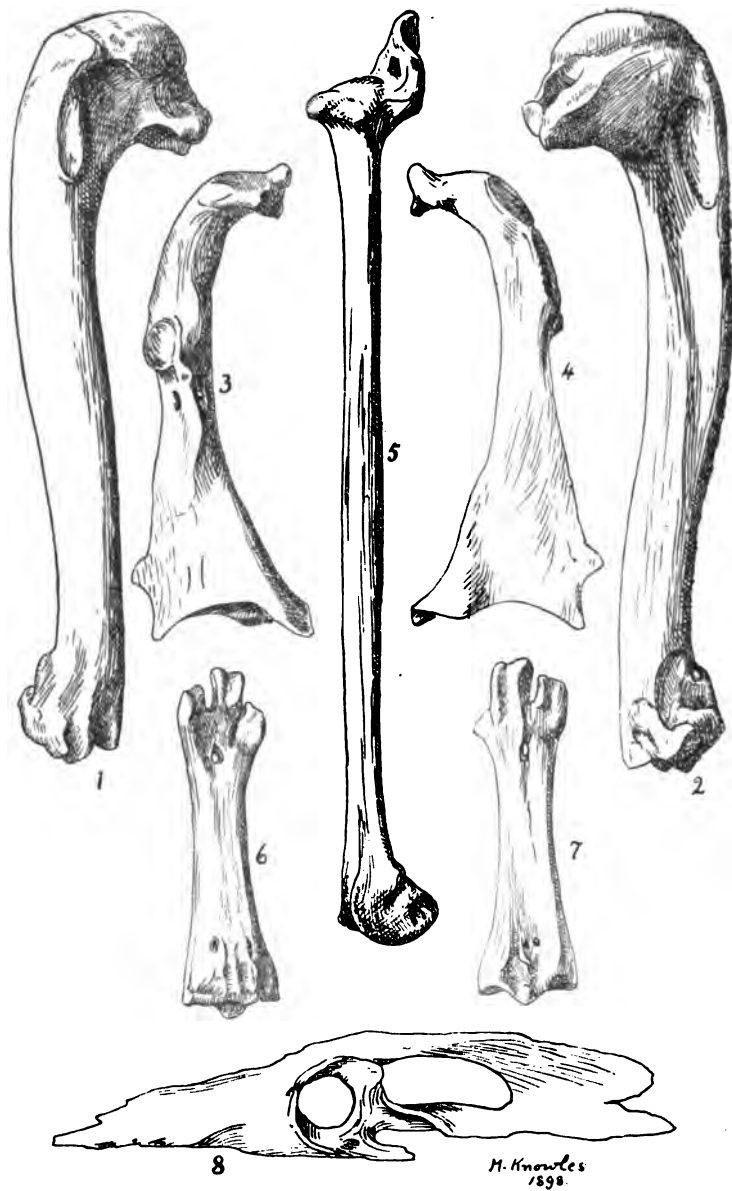


FIG. 1.—Bones of Great Auk from Kitchen-Middens, Co. Waterford.

1, 2.—Left Humerus. 3, 4.—Left Coracoid. 5.—Right Tibia.
6, 7.—Right Metatarsal. 8.—Pelvis.

fishes. There are distinct species or races—such as the Gillaroo Trout (*Salmo stomachicus*) of Lough Neagh and the Shannon and Connemara lakes; Cole's Charr (*S. Colei*) confined to Lough Eask, Co. Donegal, and Lough Dan, Co. Wicklow; and the Pollan (*Coregonus pollan*) of Lough Neagh and Lough Erne*—which, though only found in Ireland, are closely related to forms inhabiting the freshwaters of Great Britain. An ancient freshwater home for the ancestors of these allied fishes may probably be looked for in a former lake and river valley occupying the bed of the present Irish Sea.

INVERTEBRATES.

In this brief sketch it is only possible to indicate a few of the more interesting features of the Irish invertebrate animals, as illustrated by some of the groups that have received a fair amount of attention from naturalists.

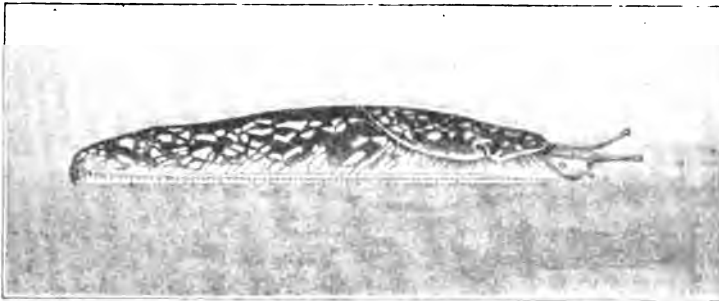


Fig. 2.—The Kerry Spotted Slug (*Geomalacus maculosus*).

The most characteristic member of the ancient Lusitanian fauna is the Spotted Slug (*Geomalacus maculosus*) which inhabits a considerable tract of country in western Kerry and Cork, notably in the neighbourhood of Kenmare. It is found nowhere else in the British Islands, and is quite unknown in Central Europe, but reappears in north-western Spain and Portugal. Its range, therefore, recalls that of the characteristic western Irish plants. The colours of this interesting slug harmonise closely with the lichen-covered rocks on which it lives; in dry weather it retires into deep crevices.

Several other Irish molluscs, though less restricted in their range than *Geomalacus*, clearly belong to the same faunistic group. That prettily-marked Snail *Helix pisana*, for example, which inhabits the eastern coast of Ireland from Rush, Co. Dublin, northwards to Drogheda, and reappears on the opposite shore of St. George's Channel in South Wales and Cornwall, is found on the Continent only in southern France and around the Mediterranean shores. It ranges also to the Atlantic islands—Madeira and Azores—suggesting the possible extension of the ancient continent far to the west. The markedly discontinuous and restricted range of these Lusitanian

* W. Thompson. "The Natural History of Ireland." London, 1849-66.

† R. F. Scharff. "The Irish Land and Freshwater Mollusca." *Irish Nat.*, vol. I., 1892.

A. R. Nichols. "A List of the Marine Mollusca of Ireland." *Proc. R. I. Acad.* (3), vol. v., 1900.

species shows clearly that they are the most ancient section of our fauna, and there can be little doubt that they came into our area as long ago as the Miocene (middle Tertiary) period of geologists.

The poverty of the Irish Butterfly fauna recalls that of the mammalian, many familiar English Butterflies—

Insects.* *Vanessa polychloros*, *Limenitis sibylla*, and *Apatura iris*, for example, being quite

unknown. One of the most interesting of Irish Butterflies is *Erebia epiphron*—the "Mountain Ringlet"—which inhabits some of the western mountain ranges—Croagh Patrick, Nephin Beg, and the hills near Sligo. The "Irish Burnet" Moth (*Zygæna pilosella* var. *nubigena*) is abundant in the limestone districts of Cos. Galway and Clare; for many years it was unknown elsewhere in the British Isles, but its range has now been traced into western Scotland (near Oban) and Wales. The dark form (*Barrettii*) of the south European *Dianthæcia luteago* inhabits the cliffs of Howth, Co. Dublin (now very sparsely) and Co. Waterford; this form has in recent years been found also in Wales, Devon, and Cornwall. These insects may perhaps belong to a southern faunistic group somewhat less ancient than the true Lusitanians, but they are doubtless very old inhabitants of our area, in some part of which they must probably have survived the severe conditions of the Pleistocene "Ice Age."

A marked characteristic of Irish moths is their tendency to assume dark varietal forms. This is well illustrated by the almost jet-black races of *Epunda lutulenta* which occur near Sligo. In this character the Irish moths resemble those of the Scottish Highlands, and the



FIG. 3.—Pyrenean Weevils (*Otiorrhynchus auro-punctatus*), Co. Dublin.
Magnified 4 times.

moisture of the climate may very probably be regarded as the cause.

The mingling of the ancient northern and southern faunas in Ireland is very markedly shown by the Beetles. There are species like *Carabus clathratus*, confined in Great Britain to the northern

* W. F. de V. Kane. "A Catalogue of the Lepidoptera of Ireland." *Entomologist*, vols. xxvi.-xxxiv., 1893-1901. W. F. Johnson and J. N. Halbert. "Numerous papers on Irish Beetles in *Irish Nat.*, vols. i.-ix., 1892-1901. (A complete list of Irish Beetles in preparation for *Proc. R. I. Acad.*) A. H. Haliday. "Papers on Irish Diptera and Hymenoptera in *Entom. Mag.*, vols. i.-v., 1833-8.



Sea-Urchins In Rock-pools at Bundoran, Co. Donegal.

half of the island, but ranging in Ireland to the far south-west. Still more remarkable is *Pelophila borealis*—a small black ground-beetle found by lake-shores in the western half of Ireland from north to south, but confined in Great Britain to the Orkneys and a few western Scottish localities, and on the Continent to fairly high northern latitudes. In contrast to these we have such south-western species as the weevils *Mesites Tardyi*, spread throughout Ireland in wooded districts, but restricted to a few scattered localities in western Britain (Clyde area, Devonshire), and *Otiorrhynchus auropunctatus* ranging in the north and east of Ireland from Donegal to Wicklow, but known elsewhere only in the districts of the Pyrenees and the Auvergne.

Similar characteristics are shown by other related groups. The common Dublin house-spider (*Tegenaria hibernica*), for example, quite unknown in Great Britain, is nearly related to a Pyrenean species.* A millipede (*Polydesmus gallicus*), generally distributed in Ireland, seems absent from Great Britain, but reappears in south-western Europe and the Atlantic Islands.† Turning to the Crustacea, we have in the small shrimp-like Schizopod *Mysis relicta* of Lough Neagh, one of the most interesting of Irish animals. Inhabiting freshwaters in Ireland, Sweden, Norway, Russia, and North America, it nevertheless belongs to a marine genus, and is still living in the Baltic; its distribution indicates, therefore, a former extension of the sea over a great part of north-western Europe. No detailed reference to marine crustacea is possible in this sketch, but several forms of much interest have been dredged from deep water off the west coast.

Two south European earthworms (*Allolobophora Georgii* and *A. veneta*) have been discovered in Ireland in recent years. Of the interesting but obscure group of the Land Planarians, in addition to the common European and British *Rhynchodemus terrestris*, Ireland possesses a species—*R. Scharffi*—which has not yet been found elsewhere.

Noteworthy among Irish shore-haunting echinoderms is the Purple Sea-urchin (*Strongylocentrotus lividus*) which may be found in numbers along the west coast northwards to Donegal, the specimens resting in the cup-shaped hollows that they excavate in the rocks. This species ranges in Ireland much farther north than elsewhere, as in Great Britain it is found only in the south-west, and on the continental coasts from France southwards. In the deep water to the west, northern and southern forms mingle in the Irish marine area. § Among the northern species the handsome scarlet sea-cucumber *Holothuria tremula* and the starfish *Pontaster tenuispinis* are noteworthy. The steep submarine slope beyond the 100-fathom line, where such specimens are dredged, suggests irresistibly the western shore of an old continent stretching from north to south.

* G. H. Carpenter. "A List of the Spiders of Ireland." *Proc. R. I. Acad.* (3), vol. v., 1898.

† R. I. Pocock. "Notes upon some Irish Myriopoda." *Irish Nat.*, vol. II., 1893.

‡ H. Friedl. Papers on Irish Earthworms. *Irish Nat.*, vols. I.-IV., 1892-5. R. F. Scharff. "The Irish Land Planarians." *Irish Nat.*, vol. IX., 1900.

§ A. C. Haddon and W. S. Green. "Second Report on the Marine Fauna of S.W. Ireland." *Proc. R.I. Acad.* (3), vol. I., 1899.

Among the lower forms of life, reference must be made to the recent discovery by Dr. Hanitsch of three

Sponges.*

North American species of freshwater Sponges—*Ephydatia crateriformis*, *Tubella pennsylvanica*, and *Heteromeyenia Ryderi*—hitherto unknown in Europe, in various lakes in the west of Ireland. This discovery shows that the peculiar assemblage of North American plants inhabiting western Ireland are accompanied by animals—albeit lowly ones—of the same distributional group. Little doubt can be entertained that these American forms, with their distribution east of the Atlantic so greatly restricted, are older than the animals of the ordinary Northern type with a wide circumpolar range. They support the theory of an ancient land-connection to the north of the Atlantic by means of which many of the Arctic species common to Europe and North America were able to make their way between the two continents.

The remains of this old continental coast, connecting Scandinavia with Scotland, and Scotland with Ireland, probably lasted until the Pleistocene "Ice Age" had passed away. Across it passed the latest of those animals that journeyed to Ireland overland. The fact that it broke down before so many of the British animals could make their way thither explains the poverty and interest of the Irish fauna. For, had the newer eastern group been able to invade Ireland, it is unlikely that the many ancient forms of life could have survived there, to delight the naturalist of to-day.

ECONOMIC ZOOLOGY.

The peculiarities of Ireland and its animal inhabitants are not without influence on the practical life of the farmer. He may congratulate himself, for example, that such members of the Eastern fauna as the vegetable-feeding Voles—which in British and Continental localities have been known to increase and multiply to a regular plague—are absent from Ireland. The Hedgehog is certainly a more desirable insect-eater than the absent Mole, since the latter feeds largely on the valuable earthworms, and disturbs agricultural land by his underground journeys. The House-sparrow, the only bird perhaps that is an almost unmitigated enemy to the farmer, seems, at least in the remoter parts of Ireland, to be less numerous than in Great Britain.

The damp climate of Ireland is especially favourable to the rapid multiplication of Slugs and Snails, and much damage to green vegetable produce is due to the hungry appetites of these molluscs. The small slug *Agriolimax agrestis* is perhaps the chief offender. Garden plants are often destroyed by Woodlice, which are unusually numerous in individuals in Ireland, especially the species *Porcellio scaber* and *Oniscus asellus*. But as in most other countries, the most serious ravages to farm crops are due to Insects.† That characteristically Irish crop, the Potato, suffers comparatively little from insect-pests, though every dry summer many large caterpillars of the "Death's-head" Moth (*Acherontia atropos*) may be found feeding, usually by night, on the foliage. Beans and Peas are often attacked by their characteristic black and green Aphids, and the imported

* R. Hanitsch. "The Freshwater Sponges of Ireland." *Irish Nat.*, vol. iv., 1895.

† G. H. Carpenter. Reports on Economic Entomology in *Reports of R. Dub. Soc.*, 1891-1900.

seeds for these crops contain too often the destructive beetles of the genus *Bruchus*. The Mangold and Beet crops are especially subject to insect-ravages in Ireland; the white fleshy maggots of the Mangold Fly (*Pegomyia betæ*) mine the tissues of the leaves, the caterpillars of the "Silver Y" Moth (*Plusia gamma*) feed openly on the foliage, while the grubs of the Black Carrion Beetle (*Silpha opaca*) eat up young plants. The Carrot is often injured by the root-feeding maggot of the Fly *Psila rosæ*, while Celery-leaves are mined by the grub of *Acidia heraclei*. Cabbages and Turnips are attacked above-ground by the caterpillars of the White Butterflies, and the irrepressible Flea-beetles ("Fly"), and underground by the "Surface" caterpillars of Agrotid Moths, and the maggots of *Phorbia brassicæ* and other Root-Flies.

Corn crops and pasture lands suffer greatly from the "leather-jacket" grubs of Crane-flies, and the Wire-worm grubs of Click-beetles. The moist, imperfectly drained soil in many parts of the country is especially favourable to Crane-flies. As in Great Britain *Agriotes obscurus* and *A. lineatus* are common Click-beetles; but the most abundant and destructive of these insects in Ireland seems to be *Athous hamorrhoidalis*. Cockchafer grubs are sometimes injurious, and in certain summers the smaller Chafer *Phyllopertha horticola* multiplies to such an extent in the western counties as to become a serious plague. The absence of trees in many districts of Ireland entails an absence of Rooks and other insect-eating birds, and a consequent alarming increase in the numbers of insects. On the other hand, the numerous sea-birds in the maritime counties often do great service to the farmer by devouring grubs as they follow the plough.

Among the insects affecting fruit trees, the most prevalent are the "American Blight" on the Apple, and the grubs of the Sawflies (*Nematus ribesii* and *Eriocampoides limacina*) of the Gooseberry and Pear respectively. The extension of Fir-plantations in Ireland has been followed by a spread of the characteristic pine-insects. The great pine Sawfly (*Sirex gigas*) is now established throughout Ireland, but the accompanying beetles—the weevil *Hylobius abietis*, and the bark-borers—*Hylurgus piniperda* and various species of *Hylastes*—are more destructive. Among insects which injure other forest trees, the bark-beetle of the Ash (*Hylesinus fraxini*) and the caterpillar of the "Hornet-clearwing" Moth (*Trochilium crabroniformis*) burrowing in the wood of Willow and Poplar may be mentioned as especially noteworthy. The "Lusitanian" weevil *Mesites Tardyi* is often common enough to injure seriously the timber of Beech and Holly. In a grazing country like Ireland, the maggots of the Warble-fly (*Hypoderma bovis*) feeding beneath the skin of cattle, often cause great suffering to the beasts and loss to their owners. The allied Bot-fly of the Horse (*Gastrophilus equi*), whose maggots feed on the lining of the stomach, is also too common.

Although insect-ravages to crops and stock may be less serious in Ireland than in countries with a richer fauna, the subject has received less attention than it deserves from Irish agriculturists. The most effective means for destroying injurious insects are found to vary with different localities, and careful observations and experiments as to the special needs of Ireland in this respect would probably lead to valuable results. It is certain that the study of the animal life of Ireland and its surrounding seas has a most direct bearing on the welfare and prosperity of its people.

ECONOMIC DISTRIBUTION OF POPULATION IN IRELAND.

[*.* In the year 1886 Mr. Charles Booth, the well-known Economist and Statistician, read a paper before the Royal Statistical Society of London on "The Occupations of the People of the United Kingdom." The section of that Paper devoted to the analysis of the economic distribution of the people of Ireland is given below as being at once an authoritative and able review of the industrial position of this country. The figures for 1891 were prepared by Mr. Booth for the Royal Commission appointed to inquire into the Financial Relations between Great Britain and Ireland.—EDITOR.]

The following are Mr. Booth's observations in reference to Ireland :—

The picture of the industrial development of England since 1851, and her apparent position in 1881, is, on the whole, one which may be regarded with satisfaction. Nor could any changes since 1881 seriously affect this result. Every line of it shows vitality and an innate power of meeting changes of circumstances, which seems to give promise of continued prosperity.

The growth of the population of Scotland ($6\frac{1}{2}$, $9\frac{1}{2}$, and $11\frac{1}{2}$ per cent. for the three decades, 1851-1881) has been slower than that of England (12, 13, and $14\frac{1}{2}$ per cent.), and the proportions engaged in each main division of industry are somewhat different, but the points of similarity are much more noticeable than the points of difference. . . . We see a similar falling-off in the proportion connected with agriculture, a similar constancy in those connected with building and manufacture, and a similar increase under other heads.

The figures show that the two countries share each other's fortune, and make the union of feeling between them easy to understand.

But it is far different with the sister island.

If the picture given of the condition of agriculture in England and Scotland is gloomy, that of the whole condition of Ireland is much more so, and needs a treatment far more exhaustive than can here be pretended to.

In adopting the method already employed for England and Scotland, it must be remembered that, in place of increasing, the whole population has decreased. The amount of this decrease from 1841 to 1881 is three millions out of eight millions of persons, and is made up as follows :—

From 1841 to 1851,	1,623,000	} 3,000,000*
„ 1851 to 1861,	...	...	753,000
„ 1861 to 1871,	...	...	386,000
„ 1871 to 1881,	...	...	238,000

The general picture at each period stands as under: 1841 is taken as the starting-point, because it is necessary to begin from before

* The preceding increase of population had been :—

From 1821 to 1831,	...	...	985,000
From 1831 to 1841,	...	...	408,000

the famine of 1846-47, and the returns of 1841 for Ireland appear to be sufficiently correct:—

TABLE A.—Showing occupations of the People of Ireland by Per-centage.

Occupations.	1841.	1851.	1861.	1871.	1881.	1891.*
Agriculture, &c., ...	509	484	429	407	411	437
Fishing, ...	02 } 513	04 } 492	03 } 436	04 } 414	05 } 420	5 } 444
Mining, ...	02	04	04	03	04	2
Building, ...	20 } 293	20 } 248	24 } 231	22 } 217	24 } 184	26 } 204
Manufacture, ...	273	228	207	195	160	178
Transport, ...	05 } 31	14 } 50	18 } 59	21 } 67	22 } 70	26 } 80
Dealing, ...	26	36	41	46	48	54
Industrial Service, ...	— 12	— 23	— 75	— 75	— 67	— 66
Industry, ...	— 849	— 813	— 801	— 773	— 741	— 794
Public and Professional Service, ...	116	22	37	43	50	58
Domestic Service, ...	94 } 151	94 } 187	133 } 199	152 } 227	180 } 259	122 } 206
Others, ...	41	71	29	32	29	26
	— 1000	— 1000	— 1000	— 1000	— 1000	1000

* Of those engaged in productive industry (or agriculture, fishing, mining, building, and manufacture), although in actual numbers there has been a decline of 76,000 in the 10 years, the proportion to the total of those employed shows an apparent increase from 60·4 in 1881 to 64·8 in 1891. This increase is, however, in reality mainly due to the changed method (already noted) of enumerating those engaged in domestic work, which, by transferring a great body of women from the occupied to the unoccupied class, has reduced domestic service by 6 per cent., and has correspondingly increased the proportion of the other occupied classes.

With dependents apportioned to each class, the following are the figures:—

TABLE B.—Showing Means of Support of the People of Ireland by Per-centage (Estimate).

Occupation.	1841.	1851.	1861.	1871.	1881.
Agriculture, &c., ..	621	557	511	487	495
Fishing, ...	03 } 627	05 } 567	04 } 530	05 } 496	06 } 505
Mining, ...	03	05	05	04	04
Building, ...	23 } 211	26 } 188	33 } 185	32 } 175	34 } 158
Manufacture, ...	183	162	152	143	124
Transport, ...	08 } 32	19 } 52	24 } 63	28 } 72	29 } 74
Dealing, ...	24	33	39	44	45
Industrial Service, ...	— 16	— 30	— 80	— 89	— 82
Industry, ...	— 886	— 837	— 858	— 832	— 819
Public and Professional Service, ...	118	25	46	51	60
Domestic Service, ...	42 } 114	44 } 163	64 } 142	76 } 168	88 } 181
Others, ...	54	94	32	41	33
	— 1000	— 1000	— 1000	— 1000	— 1000

† Army and Navy were omitted from the Census of Ireland in 1841 and 1861.

‡ It is probable that domestic service should be 1 per cent. more in this year, and farm service (agriculture) 1 per cent. less. The returns point to confusion in this respect.

The numbers employed in agriculture have decreased since 1841 by 858,000, out of a total of 1,844,000, and those who may perhaps be counted as supported by agriculture by $2\frac{1}{2}$ out of five millions. Nor is this all, for these reductions being proportionately greater than those for the whole population, the percentage employed in or supported by agriculture has decreased as well as the total numbers.

The land in England and Scotland employs as many, and probably supports nearly as many, as it did in 1841, and meanwhile other productive industries support the bulk of our great increase of population. In Ireland, on the other hand, not only does the land fail to support half of those it once in some fashion maintained, but other productive industries (*e.g.*, building and manufacture) are even worse off, and, like agriculture, show it both in numbers and per-centage; those engaged in building and manufacture (taken together) being 10·9 less in per-centage, as well as 626,000 fewer in number, than in 1841.

It is when taken together that these facts appear so serious as evidence of decadence. It might be well that fewer people, or that a smaller proportion of the population, should attempt to obtain a living from the land; and, on the other hand, the abandonment of industries for which the country has no advantages might be no loss, whether accompanied by a general loss of population or not; and, although a painful process, a general reduction in numbers of population by death and emigration may finally conduce to the benefit of those who remain; but if all these things happen at once—if a reduced population finds less work to do per man—it is hard to obtain any encouragement from the figures. The best that can be hoped is that some ultimate advantage may lie at the end of a road not yet all trodden.

Nevertheless, the view is commonly held that in general well-being Ireland has enormously improved since the famine. No evidence of this improvement is to be found in the occupation returns, which, on the contrary, point to a demoralisation of industry likely to be the cause, as well as consequence, of poverty and waning trade, and certain to be the source of political discontent. I know that figures may be, and are, drawn from bank deposits and other returns which seem to tell a different story. I shall not attempt to reconcile this conflict of evidence. To do so would be beyond the scope of this paper. I can only state the conclusions to which the census returns point.

There may be much that is delusive in the rather golden picture of the industrial condition of England and Scotland that has been given; the tide may have turned since 1881, or even before, and the number of the unemployed or partly employed in each trade, whose lack of employment is not considered in our occupation returns, may make the reality very different; but in the picture of desolation which the Irish figures afford there seems little room for delusion. When industries decay, those who have been supported by them cling to their employment as long as possible, and what in England *may* have happened, that the numbers given include many who no longer find a living in what they profess to do, has certainly occurred in Ireland. In such a case the facts are assuredly worse than the figures disclose.

The subject may be taken from another side. It will be seen that the percentage of the Irish population actually returned as

engaged in productive industry (or agriculture, fishing, mining, building, and manufacture) has fallen from 80·6 per cent. in 1841 to 60·4 per cent. in 1881, or progressively thus:—

1841.	1851.	1861.	1871.	1881.
Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
80·6	74·0	68·7	63·1	60·4

the percentage of those otherwise engaged having risen in proportion from about 20 per cent. to about 40 per cent. I shall try to show what proportion of this increase in non-producers offers any compensation. It is divided thus:—

	Per Cent.
Increase in Transport	1.7
„ Dealing	2.2
„ Industrial Service	5.5
„ Public and Professional Service ...	3.4
„ Domestic Service	8.6
„ Property Owning	0.6
	<hr/> 22.0
Decrease in Indefinite	1.8
	<hr/> 20.2

The increase under Transport is connected with improvements in commercial system, and is not to be objected to. Of that under Public and Professional Service, which is very considerable, it is impossible to say much without entering upon ground more political than economical. The items in detail are as follow:—

	1841.	1881.
	Per cent.	Per cent.
Administration,	6 000, or 0·2	11,000, or 0·5
Army and Navy,	— —	40 000 „ 1·7
Police and Prisons,	11,000 „ 0·3	18 000 „ 0·8
Law,	5,000 „ 0·1	5 000 „ 0·2
Medicine,	7,000 „ 0·2	7,000 „ 0·3
Art and Amusement,	4,000 „ 0·1	3,000 „ 0·1
Literature and Science,	— —	1,000 „ —
Education,	17,000 „ 0·5	22,000 „ 1·0
Religion,	7,000 „ 0·2	14,000 „ 0·6
	<hr/> 57,000 „ 1·8	<hr/> 121,000 „ 5·0

* The soldiers in Ireland were omitted from the Census, 1841.

We may compare these with the parallel figures for Scotland, which are as follows :—

	1841.	1881.
	Per cent.	Per cent.
Administration, ...	4,000, or 0·4	10,000, or 0·6
Army and Navy, ...	5,000 „ 0·5	8,000 „ 0·5
Police and Prisons, ...	2,000 „ 0·2	4,000 „ 0·2
Law, ...	6,000 „ 0·5	7,000 „ 0·5
Medicine, ..	6,000 „ 0·5	10,000 „ 0·6
Art and Amusement, ...	2,000 „ 0·2	5,000 „ 0·3
Literature and Science, ...	— —	1,000 —
Education, ...	7,000 „ 0·6	19,000 „ 1·1
Religion, ...	3,000 „ 0·3	6,000 „ 0·4
	35,000 „ 3·2	70,000 „ 4·2

The increase in Ireland, though large, does not (if the Army and Navy be omitted) bring the per-centage for 1881 so high as that of Scotland, or by any means so high as in England, and, except for the item of Police and Prisons, there is not much to be objected to.

It is otherwise with the increases under all the other heads. It is impossible to account satisfactorily for the increase which is to be found in the numbers as well as per-centage of the dealers—those who live by buying and selling. This increase cannot be traced to any improved system of distribution, nor can we account for it, as we may in England and Scotland, by the fact that increasing production or greater wealth increase the volume to be distributed, and that our foreign trade has made of Great Britain a shop to which all the world come to buy. It seems evident that the multiplying of this class in Ireland can only be taken as a sign of want of more useful employment.

In *Industrial Service* the commercial portion of the class was 12,000 in 1841, and 16,000 in 1881; an increase which, like that in Transport, may be satisfactory, as pointing to improvement of system, but this is not so with the main increase in this class—that of general labourers, from 31,000 in 1841, to 144,000 in 1881.

These labourers (who no doubt to some extent belong to the agricultural class) can hardly be added to the ranks of productive industry. They take their origin from the destitute class who appear in the return of 1851 (after the famine) as “indefinite,” and who, dropping out of this unnamed position, appear in 1861, and continue in 1871 and 1881, as “general labourers.” It is true that this class is, relatively, almost as considerable in England and Scotland as in Ireland, but there is a great difference in the fact that in the former countries they have always been a numerous order connected with the manufacturing and building industries, whereas in Ireland they have no such basis of support, and sprang into existence, not from any need of their services, but as the outcome of agriculture and industrial distress and charitable doles on an enormous scale.

Domestic Service has risen with a steady progression from 9·4 per cent. in 1841, to 18·0 per cent. in 1881. It may perhaps be reasonable that the loss of a large poor population should increase the proportion, to the whole, of those classes who can afford to keep servants; but this would not account for the large positive increase in the total number of servants (85,000), nor for the extraordinary fact that the proportion of servants to population in so poor a country as Ireland is considerably higher than it is in England, and as much as $3\frac{1}{2}$ per cent. higher (comparing the per-centage) than it is in Scotland. And it must be remembered that it was not so in 1841, when the per-centage for Ireland was much less than for England and Scotland. The figures are as follows, taking the proportions first to the employed, and second to the whole population:—

			On the Employed.		On the whole Population.	
			1841.	1881.	1841.	1881.
			Per cent.	Per cent.	Per cent.	Per cent.
England,	...	...	16·2	15·7	6·8	7·1
Scotland,	...	...	12·2	11·1	5·2	4·9
Ireland,	...	...	9·4	18·0	4·2	8·2

What is the explanation of these remarkable figures? It would be simplest to show that they are incorrect, but apart from some difference in the method of tabulation (alluded to in the Census Report for 1881, but not specified), I have found no loophole of escape, and the comparison of successive decades shows how gradually the position of Ireland was reversed, from being the most economical to being the most extravagant in Domestic Service. The only explanation that suggests itself is that servants are more numerous where poverty makes service cheap.*

The slight increase in the per-centage under Property Owning would also be unobjectionable, if any conclusion could be fairly drawn from the figures, but, as we have already seen in the case of England, the returns under this head are entirely delusive.

Against these increases has to be set off a decrease in the Indefinite class, which is returned as 122,000 in 1841, against 38,000 in 1881.

To bring the figures roughly together, so as to show what portion of the increase of non-producers may be satisfactory or not unreasonable, and what portion must, as I think, be considered unsatisfactory, I submit the following table. The difference in condition and indus-

*The total number of persons engaged in domestic service was reduced from about 425,000 in the Irish Census of 1851 to about 265,000 in that of 1891. This was due in great part to the removal in 1891 from the heading of "Others engaged in service" of females, who were in the Census of 1851 to the number of about 152,000, placed under that description. These women were returned as "housekeepers," but were really wives or other near relatives of heads of houses. In the Census of 1891, they are mostly included in Order 24, the "Indefinite and Non-Productive Class." (Irish Census Report, 1891, Part II, p. 23). B. H. H.

trial utility between the small dealers and general labourers and the undefined class is probably very slight, and for this purpose they may be counted together:—

TABLE C.—Showing Transfer of Employed from Productive to Non-Productive Industry between 1841 and 1881.

—	Per cent.	—	Per cent.	Per cent.
Decrease in those employed directly in productive industry.	20·2	Increase in those employed by non-productive industry:—	•	
		(Satisfactory or not unreasonable)—		
		Transport, ...	1·7	} 6·1
		Commercial Class,	0·4	
		Public and Professional Service,	3·4	
		Property Owning, ...	0·6	
		Unsatisfactory—		
		Domestic Service, ...	8·6	} 14·1
		Dealing and general labour (less decrease in indefinite class).	5·5	
	20·2			20·2

Although this calculation must be accepted with very great reserve, it may yet give us a fair idea of the extent to which Ireland, besides its great decrease of numbers, has also deteriorated in the quality of work performed by those who remain. It shows us that since 1841 more than 14 per cent. of the employed population have been transferred from direct production to occupations which can at best add little to the wealth of the community.

In confirmation of this, if we turn to the details of those who figure under the head of Manufacture, we find only one occupation which has increased considerably in per-centage, while on the whole there has been so great a decrease; this is under the heading Dress; and going into further detail we find that in Dress it is the shirt-makers only who have increased in numbers, viz., from 47,300 to 71,000; so that once more it is only in the last refuge of destitute women that we find any increase.

A detailed review of productive industry in Ireland, to which we will now return, will show us more closely where the falling off has occurred.

The decrease in those employed in *Agriculture*, though affecting each branch, shows itself, of course, mainly in the labourers and farm servants, which have fallen from 1,326,000 in 1841, to 329,000

in 1881, or 75.2 per cent. The decrease in farmers, from 471,000 to 442,000, is only 6.2. The figures in regard to those engaged about animals, which show a large decrease, are fallacious, because a great number of persons who were in the earlier census classed as herds, have in 1881 been counted with farm servants, which would tend to make the truth as to the farm servants even worse than appears.

Fishing and *Mining* are small industries in Ireland. The former has increased from 9,000 to 11,000, or from 0.2 per cent. to 0.5 per cent. of the employed population; mining has fluctuated considerably at each decade, but ultimately shows a slight falling off in bulk. In per-centage, however, it has risen from 0.2 per cent. to 0.4 per cent.

In 1841 there were 72,000 persons occupied in *Building*; in 1881 there were but 56,000; nevertheless the per-centage to the total employed population has increased by 0.4 per cent.

The total employed in *Manufacture* has dropped from 989,000 to 379,000 (or 61.7 per cent.), and the per-centage to the whole occupied population from 27.3 per cent. to 16 per cent. Machinery and tool making employ a very much smaller proportion of workers than do these trades in England and Scotland, but the numbers have risen slightly, and now form 0.2 per cent. of the employed. The way in which Ireland has failed to share in the growing prosperity of the other portions of the kingdom is, however, strikingly exemplified in these trades, for whilst the great development of machinery during the last 40 years has enabled England and Scotland combined to add nearly 200,000 to their number of workers in this branch, Ireland during the same period has found a new opening in this direction for barely 1,000 persons. This will be found to throw a cross light on our next point (textile fabrics), where more strongly than elsewhere we find the evidence of industrial decay.

It appears that in 1841, 696,000 persons were enumerated as employed in textile and dyeing industries. Since then the decline has been startling, to 424,000 in 1851, 275,000 in 1861, 218,000 in 1871, and finally to 130,000 in 1881. In the meantime England, starting with only 604,000 in 1841, has progressed to 962,000 in 1881. These figures include spinning, and it is to the loss of this hand industry, which passed to English machinery, that the reduction is largely to be traced. There is no body of women similar to the Irish spinners to be found in the English returns of 1841, though there is a large number of women weavers who fall away later. It may be that domestic spinning existed in England and was not returned at all; or it may be that a larger share of this industry fell to Ireland. At any rate, we have the singular fact that in 1841 Ireland returns more workers in this section (textiles) than England, but in 1881 not one-seventh of the number. If the spinning industry was spread over the country, and an aid to every family whose men only were needed on the land, it would go some way to explain a wreck of prosperity.

The figures for textile manufacture show a very general decline, to which even flax and linen cannot be considered exceptions.

The detailed facts as to the textile industries of Ireland are as follows :—

(In thousands and decimals of a thousand).

Occupations.	1841.	1851.	1861.	1871.	1881.	1891.
Woollen cloth manufacture, ...	80.7	45.9	16.6	20.4	7.1	6.3
Worsted and stuff manufacture, ...	0.1	0.1	0.1	0.1	0.1	.1
Flannel manufacture, ...	23.0	—	—	—	—	—
Carpet and rug manufacture, ...	—	0.3	0.1	0.1	0.1	—
Woollen knitters, ...	—	35.6	19.7	—	—	.2
Others, in wool, ...	—	—	—	—	0.3	—
Cotton and cotton goods manufacture, ...	6.0	16.1	9.8	7.0	3.9	2.3
Silk and silk goods manufacture, ...	0.6	0.6	0.5	0.8	0.6	.3
Ribbon manufacture, ...	0.2	0.1	—	—	—	—
Grape, gauze, shawls, and fancy goods (textile) manufacture, ...	0.9	64.0	41.7	18.5	8.1	3.8
Weavers, spinners, and factory hands (undefined).	441.0	86.0	101.6	103.3	24.0	7.4
Flax, linen, and damask manufacture,*	135.3	124.9	73.8	55.6	79.1	88.7
Canvas and sailcloth manufacture, ...	—	0.2	0.2	—	0.1	—
Sacking and bag manufacture, ...	—	—	0.1	0.2	0.2	.3
Hemp, jute, and cocoa-fibre manufacture, ...	—	—	—	—	0.4	.3
Rope, twine, and cord makers, ...	1.1	1.3	1.1	1.0	0.9	1.0
Net makers, ...	1.1	0.9	0.4	0.4	0.2	.1
Mat makers, ...	0.2	0.2	0.3	0.1	0.2	.1
Lace manufacture, ...	1.8	2.2	1.5	1.0	0.7	.6
Embroiderers, ...	—	41.4	3.9	5.6	1.5	4.2
Thread manufacture, ...	0.2	0.1	0.4	0.4	0.2	1.1
Tape manufacture, ...	—	—	—	—	0.2	.1
Trimming manufacture, ...	—	0.1	—	0.9	0.1	.1
Artificial flower makers and others, ...	—	—	—	—	0.5	—
Dyeing, ...	3.8	3.7	3.3	2.2	1.5	1.0
Total of textiles and dyeing, ...	696.0	423.7	275.1	217.6	130.0	118.0

* The apparent increase, under the heading of "Flax and linen," between 1871 and 1881 is negated by the striking decrease in "weavers, spinners, and factory hands (undefined)," of whom a large proportion must have been employed in the flax and linen industries.

THE RAILWAYS OF IRELAND.

Shortly after 1834, when the first railway in Ireland—the line from Dublin to Kingstown—was opened, and before any other line was commenced, a Royal Commission was appointed for the purpose of considering, with a view to developing the resources of the country, a general system of railways for Ireland, and the best methods of directing the growth of this new means of transit so that the greatest advantage might be obtained by the smallest outlay. After an elaborate survey the Commission reported that the circumstances of Ireland were entirely different from those of England, and that it could not be expected that the volume of traffic would induce private companies to duplicate the trunk lines of the country. Accordingly, the Commission reported in favour of State assistance, and in the same year resolutions to the following effect were carried in the House of Commons:—

1 “That the Irish railways should be constructed with money supplied by the British Treasury, and that they should be under State control.”

2 “That the revenue from the lines should be applied—1st, in their maintenance; 2nd, in the payment of $3\frac{1}{2}$ per cent. on their cost; 3rd, in repayment of the cost by instalments of $1\frac{1}{2}$ per cent.; 4th, in reducing the rates of carriage.”

However, in the words of the official record, “The question of Government interference was subsequently dropped, and private companies were allowed to proceed as in England and in Scotland.” One of the chief features of the Irish Railway System that thus came into existence was the great number of small companies which sprang up, and though a considerable proportion of the smaller railways have been absorbed by the great trunk lines, the three thousand odd miles of Irish railways—a mileage not exceeding by much that of a single English line, the Great Western—are controlled by nearly thirty companies, each with its own directors and salaried officials. State purchase of the railways has been not infrequently advocated as preferable to either competition or amalgamation; but any consideration of the merits of these rival schemes is necessarily outside the limitations of this article.

There are a few features which distinguish Irish railways very markedly from English. In the first place, shortly after railway activity commenced to operate in Ireland, the population began to decrease—and this decrease has since continued—so that Irish companies, instead of being almost overwhelmed, like the English railways, with traffic produced by the unforeseen growth of large towns, have had to face the opposite difficulty of paying their way in a country which becomes more and more deserted as time goes on. This fact should always be borne in mind by the critical examiner of Irish railways.

In one respect, in the matter of gauge, the railways of Ireland enjoy an immense advantage over those of Great Britain. The first railway in Ireland was constructed by a company formed in 1831 to connect Dublin with Kingstown. This line, six miles in length, was opened for traffic in 1834, and for several years was the only railway in the country, and before any of the great lines were laid sufficient

experience had already been gained to show that the standard narrow gauge of 4 feet 8½ inches which had been adopted in England was too small. "The Irish have always shown a wise liberality in their ideas as to what was a suitable gauge for their railways, and the Ulster line was originally laid out on a very large scale with a space between the rails only ten inches less than that adopted by Brunel on the Great Western. The traffic, however, was far from requiring any such accommodation, and in 1849 the company felt compelled to abandon the great width of track with which they had started and to bring their line into conformity with the others which were springing up all over the country. Since that date the Irish railways have used for main line work the uniform gauge of 5 feet 3 inches.* It is worth noting in this respect that the Dundalk, Newry and Greenore Company, though situated in the Great Northern country, is worked by the London and North-Western in connection with the steamers between Holyhead and Greenore, and the English Company, which supplies for the purpose engines and carriages of its ordinary standard patterns, has to adapt them to the Irish wider gauge. Owing to this difference in gauge there is always the possibility, remote though it may appear at present, that at some future time Ireland may be far in advance of the rest of the kingdom in railway development.

There were in the year 1899, according to the Board of Trade returns, eighteen principal Railway Companies in Ireland, and as many as thirty-one subordinate lines, which were either leased to or otherwise controlled by the former. The position of the chief lines, so far as mileage receipts and expenditure are concerned, is given in the following statement, compiled from the official returns just referred to:—

TABLE showing certain particulars as to MILEAGE, RECEIPTS, and EXPENDITURE of Irish Railways in the Year 1899.†

Name of Company.	Length of Line, 1899.	Total Receipts from all sources of Traffic.	Total Working Expenditure.	Proportion per cent. of Expenditure to Receipts.
	Miles.	£	£	
Ballycastle, ...	16	5,457	8,644	67
Belfast and County Down, ...	76	139,911	73,219	52
Belfast and Northern Counties, ...	249	312,299	192,162	62
Cork and Macroom, ...	25	17,812	9,998	56
Cork, Bandon, and South Coast, ...	94	81,086	44,685	55
Cork, Blackrock, and Passage, ...	6	21,387	14,820	69
Donegal Railway, ...	76	24,654	15,919	65
Dublin, Wicklow, and Wexford, ...	144	276,183	160,631	58
Dundalk, Newry, and Greenore, ...	26	17,073	19,685	115
Great Northern of Ireland, ...	528	887,767	468,007	53
Great Southern and Western of Ireland, ...	671	944,393	537,712	57
Listowel and Ballybunion, ...	9	2,172	2,288	105
Londonderry and Lough Swilly, ...	31	21,096	10,527	50
Midland Great Western of Ireland, ...	538	669,824	305,433	54
Sligo, Leitrim, and Northern Counties, ...	43	23,682	16,627	70
Waterford and Central Ireland, ...	66	50,028	26,461	53
Waterford and Tramore, ...	7	7,073	3,018	43
Waterford, Limerick, and Western, ...	342	251,723	151,298	60

* "Saturday Review." Much information has been derived from a valuable series of articles in the "Saturday Review" upon Irish Railway Development.

† This Table does not include the Light Railways authorized under the Tramways (Ireland) Acts, 1860 to 1883, with the exception of four small lines worked by the chief lines and included in the figures of the Table. The lines thus included are—"The Athlone and Tuam Extension to Claremorris"; the "Ballinrobe and Claremorris"; the "Loughrea and Attymon"; and the "Mitchelstown and Fermoy" Light Railways.

The following comparative statements show how Irish railways stand as contrasted with those of the other countries of the United Kingdom. It will be seen from the second statement that the cost of construction of the Irish railways, as indicated by the amount of paid-up capital, has been remarkably low as compared with the cost of those of either England or Scotland; in fact, the average cost per mile is less than one-fourth of the cost in Great Britain.

—	Length of Lines open 31st December, 1899.	Total Receipts, 1899.	Total Expenditure, 1899.	Proportion of Expenditure to Receipts.	Population according to Census of 1891.
	Miles.	£	£	Per cent.	
England and Wales, ...	15,044	86,708,006	51,922,103	60	29,002,525
Scotland, ...	3,480	11,246,215	6,047,076	54	4,025,647
Ireland, ...	3,176	3,712,844	2,121,508	57	4,704,760
Total United Kingdom,	21,700	101,667,065	60,090,687	59	37,732,915

—	Share Capital, 1899.	Loans and Debentures, 1899.	Total Paid-up Capital, 1899.
	£	£	£
England and Wales, ...	769,709,195	301,708,742	1,071,417,937
Scotland, ...	122,027,308	38,176,073	160,203,381
Ireland ...	30,765,215	12,990,409	43,755,624
Total for United Kingdom, ...	922,501,718	352,875,224	1,275,376,942

It will be seen that, though the net receipts are much lower in Ireland than in Great Britain, yet owing to the much smaller cost of construction, the average dividend for Irish railways is higher than that in England or Scotland. It is of interest to note that the ordinary capital of constructed lines in Ireland upon which no dividends were paid in 1899 was £2,969,221, whilst in the same year dividends were paid on the ordinary capital of Irish railways as follows:—

Not exceeding 2 per cent.,	...	£182,554
Above 2 and not exceeding 4 per cent.,	...	382,050
„ 4 „ 5	...	7,821,395
„ 5 „ 6	...	892,763
„ 6 „ 7	...	4,035,638
„ 7 „ 10	...	350,000

The country north of Dublin is served chiefly by two large railways, the Great Northern and the Belfast and Northern Counties, the former of which connects the metropolis with the two most important places in the north of Ireland—Belfast and Londonderry—whilst the latter forms another connection between these two latter centres of industry and the adjoining districts. The Great Northern, as at present constituted, is the result of the amalgamation of a large number of separate undertakings. Even the main line was built in three distinct pieces. The Ulster Company, once famous for its broad gauge, was incorporated in 1839 to connect Belfast and Portadown. Shortly afterwards another company was formed to build a line between Dublin and Drogheda, a distance of thirty-two miles, and the gap between Portadown and Drogheda remained until considerably later, when the Dublin and Belfast Junction Company completed the communication between Dublin and Belfast, a distance of 113 miles, which remained until 1875 under the control of three separate companies. A series of amalgamations then took place, out of which, on 1st April, 1876, the present company emerged. It has in the last quarter of a century absorbed a number of smaller lines, notably, the Portadown and Omagh and the Enniskillen, Bundoran and Sligo railways. The main line is along the east coast between Dublin and Belfast, and there are two main branches from Dublin to Londonderry in the north and to Bundoran in the west, whilst the connection between Belfast and Londonderry, *via* Portadown, is only a little longer than the route of the Belfast and Northern Counties. The trains have been considerably improved of late, and the rolling stock is now very good, breakfast and dining cars, and, on one journey, sleeping cars, have been introduced, and the locomotives used for the important trains strongly resemble those of the London and South-Western. The Belfast and Northern Counties Railway has grown out of a small company incorporated in 1845 to connect Belfast and Ballymena by a narrow-gauge line. It now serves the whole of the north-east of Ireland, connecting different places in Londonderry, Tyrone, and Antrim with Belfast, and has 249 miles of lines. In addition to Belfast and Dublin these two northern railways connect a number of ports which have a considerable cross-channel traffic, notably, Larne, Greenore, Dundalk, Drogheda, and Newry.

The Dublin, Wicklow and Wexford serves the eastern counties of Ireland, running southward from Harcourt-street *via* Bray to New Ross, for though the Company was originally incorporated in 1846 as the Waterford, Wexford, Wicklow and Dublin, it has not yet got as far as Waterford; but it will probably soon be extended there in connection with the Fishguard and Ross-lare scheme. It now works, under a long lease, the line between Kingstown and Dublin, which has been already alluded to as the first railway built in Ireland, and which cost upwards of £63,000 a mile. As this line has been extended to Bray the Company has thus two distinct approaches into Dublin, one along the coast *via* Kingstown, and the other inland to Harcourt-street. No other railway in the United Kingdom can show its passengers such splendid sea views. From Merrion, midway between Dublin and Kingstown, it runs along the sea front for over twenty-five miles to the town of Wicklow, and except for two miles of tunnel between Kingstown and Dalkey it is never more than a few yards from the sea shore. This line is more dependent on short distance traffic than

any other Irish railway. Its other Dublin terminus, Westland-row, is the headquarters of the City of Dublin Junction Railway, a short urban line worked by the Dublin, Wicklow and Wexford, which connects together all the railways running into Dublin.

The Midland Great Western Company has the second largest mileage in Ireland, and serves the whole of the central part of the country from Dublin across to the Atlantic. The Company was originally started in 1845 to connect Mullingar with Dublin; but extensions were soon made to Athlone and Galway, and in 1851 the through service from sea to sea was established. A number of small local lines have been since absorbed, and the Company works several of the light railways which have been built in recent years in the West, whilst the Irish Government has given considerable subsidies in order to induce the Company to make extensions of its main line to several of the poorer outlying districts where the traffic returns for some time could hardly be sufficient to justify, from a solely commercial point of view, these extensions. The Royal Canal, one of the two great Irish waterways, which runs from Dublin westward to the Shannon, was acquired by the Midland and Great Western Railway at an early stage of the Railway's career. The Company paid over a quarter of a million for the Canal, which runs alongside the railway up to Mullingar, and it is obliged to maintain the navigation, and is not allowed to vary the tolls without the consent of the Lord Lieutenant. Broadstone, the Dublin depôt of the Company, is considered to be the handsomest railway terminus in Ireland, and though the rolling stock is hardly modern it is only fair to remember that the Company does not serve any flourishing business centres like Belfast and Cork; things would probably have been very different on this line had the attempt to establish a good system of steamship communication between Galway and North America proved successful.

The Great Southern and Western Railway has grown out of the undertaking of a Company formed in 1844 to connect Cork and Dublin by rail. The mileage has increased in the usual way by the construction of branches and the absorption of smaller companies, until this railway now extends from Dublin to Valentia in the extreme south-west, to Waterford in the south-east, and to Athlone in the centre of the country. By far the most important amalgamations it has effected are those in connection with the Fishguard and Rosslare undertakings. A few years ago the English Great Western Company commenced a small branch from a few miles east of Milford to Fishguard, a harbour on Cardigan Bay. In 1893 and 1895 respectively powers were obtained to build harbours at Fishguard and Rosslare (a point on the south-eastern coast of Ireland a few miles north of Wexford), and to run cross-channel steamers between these two points. The Waterford, Dungarvan and Lismore railway which runs across Co. Waterford, and which could be made, by two short extensions, to complete the new route between England and Ireland was purchased. At this stage the Great Southern and Western and the English Great Western Companies joined hands and got a Bill passed giving them a general joint interest in and joint control of the new route and of the various works connected with it, whilst last year the former Company obtained the consent of Parliament to an amalgamation scheme which included the absorption of the Waterford and Central Ireland Railway and Waterford, Limerick and Western Railways. This latter Railway was

an important line running from Tuam, in the north of Galway, through Limerick to Waterford, and by this amalgamation the Great Southern and Western—already the largest Company in Ireland—brought its mileage up to over a thousand miles. This amalgamation has a more than local importance, for when the Fishguard and Rosslare scheme is complete there will be a route open between London and Queenstown *via* Paddington, Fishguard, and Rosslare, which will be shorter than the present journey from Euston *via* Holyhead and Dublin—a very important consideration, especially as regards the American mails. A curious feature is that these two competing routes will be worked in Ireland by the one Company—the Great Southern and Western. The locomotives and rolling stock have been greatly improved of late, possibly in view of the danger of American passengers deserting the Irish route in favour of Southampton or Plymouth.

A noticeable feature of all the Irish railways mentioned is the attention they devote to the tourist traffic. Thus the northern railways offer special facilities for transit to Carlingford Lough, the Giant's Causeway, and Portrush; the Dublin, Wicklow and Wexford exploit the famous Wicklow scenery; the Midland Great Western carry large numbers to Achill and the district about Recess whilst the Great Southern and Western have special services to Killarney, and besides offering cheap fares the Companies have of late built a number of hotels where the accommodation was previously bad or insufficient. The following figures, taken from the latest Banking and Railway Statistics, issued by the Department of Agriculture and Technical Instruction for Ireland, will help to show the present position of Irish railways as compared with thirty years ago:—

IRISH RAILWAY RECEIPTS per MILE for Passenger and Goods Traffic
in 1871 compared with 1899.

Kind of Traffic.	Receipts per Mile.		Increase or Decrease.
	1871.	1899.	
	£	£	
Passenger Traffic,	630	620	Decrease, £10, or 1·6 per cent.
All Goods Traffic,	489	526	Increase of £37, or 7·6 per cent.
Merchandise,	367	370	Increase of £3, or 0·8 per cent.
Live Stock,	92	93	Increase of £1, or 1·1 per cent.
Minerals,	29	63	Increase of £34, or 117·2 per cent.
Total Receipts from all sources of Traffic.	1,143	1,169	Increase, £26, or 2·3 per cent.

GROSS RECEIPTS of IRISH RAILWAYS in 1871 compared with 1899.

Kind of Traffic.	Total Receipts.		Increase.
	1871.	1899.	
	£	£	
Passenger Traffic (including excess Luggage, Mails, &c.)	1,252,530	1,968,266	£715,736, or 57·1 per cent.
Passengers alone (including Season Ticket Holders).	1,070,730	1,637,396	£466,666, or 43·6 per cent.
All Goods Traffic,	971,149	1,672,109	£700,960, or 72·2 per cent.
Merchandise,	729,816	1,175,490	£445,674, or 61·1 per cent.
Live Stock,	183,306	295,985	£112,679, or 61·5 per cent.
Minerals,	68,027	200,634	£142,607, or 245·8 per cent.
Total Receipts from all sources of Traffic.	2,272,386	3,712,844	£1,440,458, or 63·4 per cent.

Another aspect of the development of the traffic of the Irish Railway Systems is shown in the following statements:—

A.—STATEMENT showing the PASSENGER TRAFFIC, arranged according to CLASSES, on Irish Railways in the years 1871, 1891, and 1899.

Year.	No. of Passengers.	Per-centage of Passengers in each Class.			No. of Journeys per Head of Population	No. of Passengers per mile of Lines open.
		1st.	2nd.	3rd.		
1871, ...	15,547,934	12·5	27·8	59·7	29	7,821
1891, ...	22,202,258	6·8	18·9	74·3	47	7,755
1899, ...	27,414,633	6·7	14·5	79·8	61 Estimated Population.	8,632

B.—STATEMENT showing the GOODS TRAFFIC on Irish Railways in the years 1871 and 1899.

Year.	Mileage of Lines open.	Gross Tonnage carried.		Tons carried per Mile of Lines open.	
		General Merchandise.	Minerals.	General Merchandise.	Minerals.
1871, ...	1,938	2,441,289	472,326	1,228	238
1899,	3,176	3,617,676	1,590,103	1,139	501

The decline in first and second class passenger traffic, and the increase in third class passenger traffic are remarkable. In regard to the column in the Statement A. showing the "Number of Passengers per Mile of Lines open," it ought to be borne in mind that the mileage of Irish railways increased between 1871 and 1899 from 1,988 in the former year to 3,176 in the latter, while on the other hand, the population decreased in the same period from

5,412,377 in 1871 to an estimated population of 4,531,185 in 1899. In fact, the column showing the "Number of Journeys per head of Population" gives the more correct idea of the expansion of the passenger traffic on Irish railways at the different periods.

Still more instructive, perhaps, is the following comparison, in certain particulars, of the English Great Western system with the entire railway system of this country. The comparison would be more satisfactory if an estimate of the population of the districts of England and Wales served by the Great Western had been available; but as it stands the contrast is sufficiently striking:—

—	Length of Lines open on 31st December, 1899.	Total Passengers conveyed (exclusive of season and Periodical Tickets).	Goods Traffic.	No. of Miles travelled by Trains.	No. of Passengers per Mile of Lines open.	Total Receipts.	
						Passenger Traffic.	Goods Traffic.
	Miles.		Tons.			£	£
All Irish Railways (including Light Railways).	3,176	27,414,633	6,207,779	17,116,774	8,632	1,968,266	1,672,109
Great Western of England.	2,602	80,933,254	35,593,682	45,647,157	31,104	4,978,901	5,678,465

It may be noted finally, that of the 3,176 miles of the Irish Railway Systems 2,555 are single lines, and only 621 double (or more) lines, while in the case of the Great Western of England the proportions are as follows:—Single lines, 1,274; double (or more) lines, 1,328.

PRINCIPAL CANALS AND RIVER NAVIGATIONS.

The Canals of Ireland were in the past of much public benefit, but, as in every other country, they have been very largely superseded by railways. Only the heavier and less valuable kinds of goods are now carried by them, and only a small percentage even of these. It is questionable however whether much could not even now be made of the Inland Navigation of Ireland, especially in the interests of the agricultural community. In all the continental countries, as well as in the United States and Canada, the State has done and is doing a great deal to foster and develop canals.

The assistance given to canals belonging to companies in Ireland in the last and commencement of the present century was chiefly in the form of loans of public money or by grants from general or special taxes. The assistance to navigations under local trustees was also by grants of public money and advances secured on local taxation. To those under the Commissioners of Public Works, it was given in the case of the Ulster Canal by loans, of the Shannon Navigation by grants and advances secured on local assessment, and of the other navigations by grants from special or general taxes. The total cost of 708 miles of canal and river communication has been estimated at £4,722,211, made up as follows:—£385,364 charged on counties, £2,296,349 raised from private sources, and £2,040,098 from grants of public money.

A Royal Commission was appointed on the 18th October, 1880, to make inquiries respecting the system of navigation which connects Coleraine, Belfast, and Limerick, and to report whether (1) the navigations have interfered with the drainage power of the country, and if so, whether (2) the navigations should in some cases be abandoned; or, if such is not the case, if (3) it would be expedient to make a further outlay of public money to put them in order and maintain them, and (4) what average depth of water is required for practical purposes if the whole or part of the navigations are to be maintained, and under whose direction they should eventually be placed.

It appears from the Report of the Royal Commissioners, presented to Parliament on the 8th February, 1882, that the condition of the following navigations and canals was investigated, viz.:—(1) The Lagan Navigation, (2) the Lower Bann Navigation, (3) the Navigation of Lough Neagh, (4) the Upper Bann Navigation, (5) the Ulster Canal, (6) the Navigation of Lough Erne, (7) the Ballinamore and Ballyconnell Canal, and (8) the Shannon. The following is a recapitulation of the conclusions arrived at by the Commissioners:—

1. *Lagan*.—That it be left under the management of the Company to whom it is now leased, and that the present depth of water be maintained.
2. *Lower Bann*.—That the river be managed by the Drainage Board in the interest only of the drainage of the country.

3. *Lough Neagh*.—That the control of the water of the lake, with the necessary powers of taxation and expenditure, be in the hands of the same Drainage Board, that of the Lower Bann, with the obligation of maintaining the water at "summer level."
4. *Upper Bann*.—That it remain under the present management.
5. *Ulster Canal*.—That it be sold by public competition.
6. *Lough Erne*.—Left unnoticed.
7. *Ballinamore and Ballyconnell Canal*.—That it be maintained as a drainage work by a Drainage Board, with an obligation to prevent the banks of the canal and the masonry of the locks from falling into ruin.
8. *Shannon*.—That it remain in the care of the Commissioners of Public Works, who shall, whilst maintaining the navigation, regulate the depth of the water so far as is in their power, with a view primarily to the drainage of the country.

The Grand Canal proceeds from the south of Dublin westward to the Shannon at Shannon Harbour, and

The Grand Canal. thence on the other side of the Shannon to Ballinasloe, with branches to the Liffey, Robertstown, Blackwood reservoir, Monasterevan, St. James's Well, Athy, Mountmellick, Edenderry, and Kilbeggan. The summit level, 279 feet above sea-level, and 164 feet above the Shannon at Shannon Harbour, is near Robertstown, about 26 miles from Dublin. The Grand Canal was commenced by the Commissioners of Inland Navigation, who received grants of public money, between 1753 and 1772, to the amount of £70,496. In the latter year the completion of the canal was transferred to a company. Between 1772 and 1800 the company received grants to the extent of £83,776, besides £18,231, to secure the completion of the Ringsend Docks. In 1798 the company obtained a loan of £27,692 of public money on the opening of the Athy branch of the canal, and a further grant of £138,461 was made as recommended by Government and approved of by a committee of the House of Commons in 1813, on the terms that the company should raise £46,154, to be applied, along with the £138,461, in payment of their debts. The extension of the canal from the Shannon to Ballinasloe and the Mountmellick and Kilbeggan branches were subsequently made for the purpose of giving employment to the poor, and £98,524 was advanced to facilitate their execution. The extensions were opened in 1830. In 1844 the repayment of this sum was commuted by statute for £10,000. By an Act of 1848 the original company, called "the Undertakers of the Grand Canal," was reconstituted under the name of the "Grand Canal Company." The passenger traffic on the canal ceased on the opening of the railway system, but the company received a remission of its debt to the Government to the extent of £88,524. The canal in 1889 paid the shareholders £2 per cent. interest per annum, in 1890, £1 10s., and in 1891 and 1892, £2. In March, 1894, the dividend was £3½ per cent., in 1895 and 1896, £3 per cent., in 1897, £3½ per cent., and in 1898 and 1899 and 1900, £4 per cent. It may be mentioned that this canal is the largest in the United Kingdom, so far as length of waterway is concerned.

The Royal Canal proceeds from the north side of Dublin, westward to Cloondara, on the Shannon, with a branch to Longford. The summit level, 324 feet above sea-level, and fed from Lough Owel, near Mullingar, is about 53 miles from Dublin. The first Royal Canal Company was incorporated in 1789. It received before the year 1800 grants of public money to the extent of £84,000, and from the Union to 1813 further grants of £87,692. On inquiries before Committees of the House of Commons in 1811 and 1813, it appeared that the Company had expended on making 46 miles of the canal from Dublin to Coolnahay £704,877; of this, £171,692 had been granted as already mentioned. To provide the balance, and to pay the dividends and interest, which had been paid out of capital to an extent ascertained to exceed £369,231, the Company had borrowed upwards of £738,462, and raised on share capital £276,923. In 1810 the Company had a gross income of only £13,868, and a net income, after providing for maintenance and establishment charges, of only £3,813, to meet an annual charge for interest of £45,806. Upon the representation of the Committee of 1813 as to the insolvent state of the Company's affairs, the charter was forfeited and the property transferred to the Directors-General of Inland Navigation in Ireland, who expended, between 1815 and 1822, £182,871 of public money in completing the canal from the summit level to the Shannon. In 1818 the holders of debentures issued by the dissolved Royal Canal Company were constituted the shareholders in the new Royal Canal Company. In 1845 the Royal Canal was purchased by the Midland Great Western Railway Company for the sum of £298,059, subject to the obligation of maintaining the navigation and not varying the tolls without the assent of the Lord Lieutenant of Ireland. The Midland Great Western Railway Company does not act as carriers on the canal, having only a few boats used for repairs to the navigation. The annual tonnage of all merchandise carried on the canal averages about 86,500.

The Barrow navigation connects the Athy branch of the Grand Canal with the tidal part of the River Barrow below St. Mullins, and affords water communication to Carlow, Leighlin Bridge, Bagnalstown, Goresbridge, and Graignamanna, thence, by tidal part of River Barrow, to New Ross and Waterford. Summit level at Athy, 180 feet. The Barrow navigation was commenced in 1759 by the Commissioners of Inland Navigation, and £20,769 of public money was expended. In 1790 the completion of the works was undertaken by the Barrow Navigation Company, under the Act of Parliament which enabled grants of public money to be made to the extent of one-third of the expenditure, and the company received a grant of £20,000 (Irish) 4 per cent. Government debentures, which produced only £15,897, in consideration of its raising a capital of £40,000 (Irish). The Barrow Navigation Company obtained other grants after the Union under the Act setting apart £500,000 for the completion of inland navigation in Ireland. This canal now belongs to the Grand Canal Company, having been acquired by purchase.

The river Shannon rises in Cuilca mountain, in Cavan county, passes southward through Leitrim, and thence between Connaught and Leinster and Connaught and Munster to Limerick, forming

Shannon Navigation.

in its course several large lakes, the principal of which are Loughs Allen, Ree, and Derg, and turning westward, discharges itself into the Atlantic through a large estuary between the counties of Clare and Kerry, a distance of 254 miles. The navigation is open for traffic throughout its entire length, between the northern extremity of Lough Allen and Limerick, a distance of 143 miles in a direct course; but by adding the Boyle branch of nine miles, and the Strokestown branch of six miles, a total length of river and canal navigation of 158 miles is now open; of which 129 miles, viz., from Killaloe to Leitrim, including the two branches above mentioned, are suited to the navigation of large steamers. In the main river of 115 miles the entire fall amounts only to 35 feet, which has been overcome by the erection of five locks. This important navigation, which occupies nearly a central position between the east and west coasts of Ireland, is connected with Dublin by means of the Grand and Royal Canals. The cost of the Shannon works was defrayed—£272,789 from local taxes, and £410,523 from general taxes. The amount of rents, tolls, &c., received in the year ended 31st March, 1898, was £7,204, and the expenditure amounted to £7,407 including £5,057 in works.

The Newry navigation is carried from Warrenpoint to Newry by a ship canal, which admits vessels drawing 15 feet water; thence northward by canal to Portadown, 16½ miles, where it joins the

Newry.

Lower Bann, in the bed of which river it is continued to Lough Neagh. Summit level, 76 feet, and 28 above Lough Neagh. Other canal systems are the Lagan, the River Suir Navigation, the Upper and Lower Boyne, the Foyle, the Upper and Lower Bann, the Ballinamore and Ballyconnell Navigation, the Lough Corrib, the Maigue,

the Tyrone Navigation and the Ulster Canal which proceeds from Charlemont, on the Blackwater river, by which it communicates with Lough Neagh, and passing by Monaghan

The Ulster Canal.

and Clones, enters the upper Lough Erne. The capital of the Ulster Canal Company, £160,000, was all lost, and the direct grant from general taxes was only £4,272; but the canal became public property from inability to pay £120,000, loans of public money made to it. This navigation was transferred during the year 1890 to the Lagan Navigation Company, and has ceased to be maintained out of the Imperial taxes. The defect of water supply to the summit level of this canal in dry summers causes the traffic to be somewhat intermittent and unsatisfactory, though capable of development. An extension of the Reservoir would probably meet the difficulty.

IRISH JOINT STOCK BANKS, 1800-1900.

The year 1797 marks an epoch in the history of the Bank of England and the Bank of Ireland. In that year, in view of war and the state of public credit, they were both authorised to suspend cash payments. An Order in Council was issued, Sunday, February 26, prohibiting the Bank of England from discharging its notes in specie. On March 2, 1797, the Lord Lieutenant (Earl Camden) and the Privy Council determined that—

“to prevent a want of a sufficient supply of cash to answer the exigencies of the public service,” the Directors of the Bank of Ireland “should forbear issuing any cash in payment until the sense of Parliament should be taken on the subject.”

On the same day, having received this proclamation, the Bank authorities published a notice, in which they state—

‘the governor, deputy-governor, and Directors of the Bank of Ireland, in court assembled, think it proper to comply with the above order, and to suspend the payment of specie at present; but are happy in being able to inform the public that the situation of the Bank is strong, and its affairs in the most prosperous situation; and that the governors and directors will accommodate the public with the usual discounts, paying the amount in bank notes’

At a meeting of the Dublin merchants and traders, held under the presidency of the Lord Mayor (Mr. Thomas Fleming), in the Mansion House, March 3, 1797, it was unanimously resolved to accept the notes of the Bank of Ireland, and of the several other bankers, in discharge of all sums that might be payable, and to use their utmost endeavours to make all their payments with bank paper. The result of the Privy Council regulation, repeated and enforced by the Bank Restriction Act, was a great and annually growing increase in note circulation on the part of the Bank of Ireland, accompanied by a corresponding expansion in the note issues of the private banks; and a disastrous impetus was given to the formation of these concerns.

With the suspension of cash payments in this country coincided the appearance, in great numbers, of small notes, issued by some bankers, for such sums as 1s., 1s. 6d., 2s., 2s. 6d., 7s. 6d., 9s.; and this, too, was the successful era of the forger. Bank of Ireland notes were repeatedly counterfeited, till the Directors adopted the Oldham process of note-production. In every way they then did what they could to protect the inexperienced public. In 1818, as the *Annual Register* informs us, they sent agents through the kingdom with *facsimiles* of their notes, and directions for detecting forgeries; and in Co. Wexford a representative attended the fairs, and examined notes for the country people. The same was done in other places.

In 1820, by the Act 1 and 2 George IV., c. 72, so much of the Bank of Ireland's monopoly was then removed, as enabled companies with more than six partners, *i.e.*, with any number of partners, to start and carry on business, as bankers, at fifty Irish miles from Dublin, and to borrow, owe, or take up any sum or sums of money on their bills or notes payable on demand, and to make such bills or notes payable at any place in Ireland outside that radius. At this date the Bank of Ireland was without country branches. It had no establishment outside Dublin. In Cork and Belfast there were private banks. Wexford and Mallow had one each also. The rest of the island was bankless. There was ample room, therefore, for the exercise of banking energy and enterprise. For four years, nevertheless, the Act of 1820 could not be turned to any good account. It was contended, and successfully so, that under this legislation non-residents in Ireland could not become partners in an Irish Joint Stock Bank. Thus, English capital was excluded. To remove this obstruction to bank development, the Amending Acts of 1824 (5 George IV., c. 73) and 1825 (6 George IV., c. 42) were passed. The latter year saw three Joint Stock Banks in operation in Ireland. These were, in the order of opening, the Northern, the Hibernian, and the Provincial.

The Northern Banking Company was founded in Belfast on the private Northern Bank. In 1820, with the law as it then stood, an unsuccessful attempt had been made to convert it into a Joint Stock Bank. It was the first, however, to take advantage of the Act of 1824, and commenced business in the Northern Bank Buildings, Castle-place, Belfast, January, 1825, with a nominal capital of £500,000. In the same year the Bank of Ireland opened a branch in Belfast, in Donegall-place. Belfast had then about 45,000 of a population. In 1852, when the population was over 100,000, the Northern Banking Company moved to its present head office. In 1867 it was incorporated, and the capital doubled. The capital was again doubled, and limited liability was adopted, September 1, 1883. In 1888, the Northern Banking Company, Limited, opened an office in Dublin.

The Hibernian Bank, originally known as The Hibernian Joint Stock Loan and Annuity Company, was promoted by Catholic capitalists, who, by reason of the religious tests formerly imposed, were excluded from the direction of the Bank of Ireland. It was established under a special Act of Parliament (5 George IV., c. 159), and commenced business in June, 1825, with a capital of £1,000,000, £250,000 of which was paid up. In 1868 the capital was increased to £1,500,000, and in 1873 to £2,000,000. The nominal amount of each share was then £100, with £25 paid up. In 1885 the Company underwent reconstruction, and was called The Hibernian Bank, Limited. The capital was then subdivided into £20 shares, with £5 paid up on each. In the originating Bill, the Bank sought the power of note-issue, but this, on the opposition of the Bank of Ireland, was not conceded. Tokens were then substituted, on engraved unstamped paper, with the words "Hibernian Bank Token, One Pound," with signature and date. These, it was contended, were not notes, but the Bank of Ireland resisted their circulation, and they were withdrawn. Another attempt was made to acquire the advantages of note-issue, in 1844. It was unsuccessful. In

the meantime a Bill had been promoted in Parliament to dissolve the Company, but it was rejected.

The Provincial Bank of Ireland was the third Joint Stock Bank to commence business in 1825. Its origination was at a meeting of English capitalists held in London, June 11, 1824, when the capital was fixed at £2,000,000, in £100 shares, £25 on each to be paid up. The then state of the law, which was construed to require residence in Ireland on the part of every partner in an Irish Joint Stock Bank, prevented progress, after the capital had been more than subscribed; and it was not till the Amending Act of 1825 was passed that additional steps could be taken. In that year, September 1, the first branch was opened in Cork. Branches in Limerick, Clonmel, and Derry, immediately followed. In 1826, others were opened in Sligo, Wexford, Belfast (March 1), Waterford and Galway; in 1827, in Armagh, Athlone, Coleraine, and Kilkenny; in 1828, in Ballina and Tralee; then, no branches were opened till 1831; after which, most years saw one or more additions to the number. The head office was in London, for a Dublin office was as yet precluded by the Bank of Ireland's parliamentary privilege of a fifty mile preserve, measured from the metropolis. But this was rather an advantage than otherwise. London was a greater metropolis; it was the grand metropolis of the money market; rich in experienced financiers—which could not be said of Ireland—from whom to form a highly capable directorate; while the men so chosen were certain to be untrammelled by local partialities and prejudices, so often detrimental to general interests in similar large undertakings. Local Directors, however, with restricted powers, were at first appointed at each branch. From its inception, the Provincial Bank gave the assurance of becoming a formidable rival to College-green, not only from the wealth and importance of the chief shareholders, but from the exceptional business talent that was at the head of affairs; the original board, sixteen in number, being all men of capacity, included such names as Matthias Attwood, M.P., a partner in the banking house of Spooner, Attwood's & Co.; Moses (afterwards Sir Moses) Montefiore, and Thomas Spring-Rice, M.P., subsequently Lord Monteagle and Chancellor of the Exchequer. The appearance of the Prospectus with the announcement of the towns in which branches were intended to be established, stimulated the Bank of Ireland to make a new departure, and go out into the country—a course not hitherto attempted. It at once broke ground in Cork, and, immediately afterwards, in Waterford, Clonmel, Derry, Belfast, and Westport. Such were the earliest fruits of competition.

In February and March, 1826, the Provincial Bank experienced the first "run." It took place in Cork, and was brought about by the closing of two local banks. The Bank of Ireland, though also established there at the time, was not affected by the consequent demand for gold, as it was, as yet, not liable to pay in specie anywhere outside Dublin. In 1827 the Provincial Bank made a considerable stride. In that year it became the Depository for the Excise, Stamps, and Post Office receipts for places beyond the Bank of Ireland's Dublin district, and its notes were put on a par with that Bank's, a Treasury Order authorising Collectors of Revenue to accept them in payment.

In 1828, 1830, and 1831 there were "runs," in the South more

especially. The Bank of Ireland participated with the Provincial, in the two latter years, in meeting the rush for gold in the provinces; for, in the meantime, the Act of 9 George IV., c. 81, had been passed, putting it on a level with the other existing banks, as regards paying all notes at the places where they were issued.

In the first of these years, for the convenience of the public, the Provincial Bank had opened an office in Dublin, where they paid their own notes in gold, but did not reissue them, or keep customers' accounts. Legislation was construed as not disallowing such establishments, of mere agency, but the Bank of Ireland considered the presence of the Provincial Bank in Dublin an infringement of its vested rights in the metropolis and fifty miles district, and brought an action in their vindication, December, 1828. The verdict was for the plaintiffs, with 6*d.* damages, and 6*d.* costs; which marked the public sentiment in the situation. In 1826, the Dublin merchants and traders had memorialised the Lords of the Treasury to permit Joint Stock Banks to be established in the city, indicating the disadvantages at which they were placed in comparison with other towns where banking facilities were not so restricted; but their petition for bank extension had not been entertained. The outcome of the lawsuit referred to was—an arrangement between the two Banks, which led to the Act of 1830 (1 William IV., c. 32) empowering Joint Stock Banks to pay notes in Dublin, for the purpose, only, of withdrawing them from circulation. As Mr. Malcolm Dillon says:—

“The Provincial Bank was the real pioneer of Irish banking. It fell to the lot of that institution to combat with existing prejudices, to guide legislation, and step by step to secure the freedom of trade in banking.”

Other “runs” on it took place in 1833 and 1836—and in common with the other banks, the Bank of Ireland and the National Bank particularly.

The scarcity of money in London was then so extreme that even Exchequer bills could hardly be converted into cash. Mr. Pierce Mahony stated in his evidence before the House of Commons Committee, in 1837, that the supply of gold transmitted to Ireland from the Bank of England during this panic, which lasted about a month, was almost £2,000,000. The Provincial Bank was prepared for it, and had specie on hands exceeding the amount of its note-issue. In 1839 there was another but a small “run” on the Provincial; in 1856 there was a considerable one, owing to the stoppage of the Royal British and Tipperary Banks, and other causes. In 1875 it lost heavily by the series of huge linen failures in the north of Ireland. In Belfast the Provincial had opened in 1826, in Donegall-street; in 1870, it moved to its present stately pile, erected on ground in the defunct Hercules-place, sold (very short-sightedly, and to the dissatisfaction of many Belfast Catholics at the time) by the Committee of the old Catholic Institute. In 1882, it adopted limited liability.

The Belfast Banking Company was the next in the order of establishment. It was formed, with a capital of £500,000, by an amalgamation of the old Belfast Bank and the Commercial Bank, Belfast, and commenced business August 1, 1827. Its head office was, and

is, what was the historic Old Exchange—the place where the Irish Harpers' meeting was held in 1792, where winter subscription balls were given, and where Henry Joy M'Cracken was tried and sentenced to death, July 17, 1798, being hanged at the old Market House at five o'clock the same evening. In 1846, the premises underwent alteration.

In 1865, the Belfast Banking Company was incorporated, and the capital raised to £1,000,000; August 16, 1883, it was registered as a Limited Liability Company, with a capital of £2,000,000.

In 1837 the Southern Bank of Ireland was established, with a nominal capital of £500,000, and power to bring the subscription up to £1,000,000. It sprang out of the Cork business of the Agricultural Bank, and was managed by certain of that Bank's officers. In about two months it suspended payment. Undoubtedly it promised badly, judging from facts stated about it, and its irregularities, before a Committee of the House of Commons. Mr. Pierce Mahony declared in his evidence, that, as to the credit of the shareholders, he "should be sorry to take £500 endorsed by the whole of them."

In 1835 the National Bank of Ireland—for that was its title till 1856, when the two final words were dropped—was founded by Daniel O'Connell, its first Governor. The subscribed capital was £1,000,000, in £50 shares, its constitution being that every holder of five shares had one vote, twenty shares two votes, sixty shares three votes, a hundred shares four votes. It commenced business at Carrick-on-Suir. As Mrs. Morgan John O'Connell says—

"It was intended to be especially a poor man's bank, got up for the purpose of enabling the lower classes to invest their small savings, and thus get an interest for their money, instead of trusting their pound notes to the fortunes of an old stocking, a cracked teapot, or even a hole in the thatch. These expedients for saving money were not uncommon, and those who were a little more enlightened used frequently to hand over their money to a friend to 'keep safe' for them."

The banking instinct was not strong in our peasantry in those days. Occasionally it showed itself, and then chose a wrong place of deposit. It was some time before even the Liberator's bank got properly to work among them.

"Even I," Mrs. O'Connell continues, "born five years after the National Bank was first established, have been asked by people to take charge of their little hoards. And in the old days there were many traders, like my father's [Charles Bianconi's] old friend, Mary Kirwan, who used to gain considerably by the small sums intrusted to them—of which they were allowed to keep the interest."

Originally, an unusual principle in banking, the National Bank consisted of two separate and distinct bodies and interests—the English shareholders and the Irish shareholders. In 1836 there were 246 shareholders having votes, of whom only 46 were Irish; in 1843, there were 481 shareholders, of whom only 106 were English. When a branch was opened the local and the English shareholders subscribed an equal proportion of the capital, and divided the profits. In 1837 the two stocks were consolidated, except at Clonmel and Carrick-on-Suir, where the local shareholders were indisposed to admit the whole proprietary to partake in their profits. In 1856, however, the final consolidation was arranged.

In 1836, a "run" was made on the National Bank, and others, and after the alarm was over, O'Connell issued his Manifesto to the Irish people upon the folly of their procedure. It is a statesman-like pronouncement, characterised by wise and liberally expressed feelings towards a rival bank.

In 1854 the National Bank commenced to do business in London, having taken power in its deed of settlement to open in any part of the United Kingdom. The Bank of England resisted this development, but had to withdraw its opposition after consulting high legal opinion.

The Ulster Bank began in Belfast in 1836, and in the same year opened in Ballymoney. The original capital was £1,000,000; now, £2,400,000. In 1860 its magnificent new head office in Belfast, the finest in the city, was completed. In 1862 it opened a branch in Dublin.

The rest of Ireland's banking history may be shortly dismissed. In 1843, the London and Dublin Bank was opened, with a capital of £260,000. It lasted till 1848. The business was then transferred to the National Bank. In 1862 the Union Bank of Ireland was founded, with a nominal capital of £1,000,000, and went into liquidation in 1868. The business was divided between the Munster Bank and the Hibernian Bank. In 1863 the English and Irish Bank was established, with a nominal capital of £2,000,000, and was taken over by the European Bank in 1864. In that year the European Bank opened a Dublin office, but relinquished it the following year, the business being transferred to the Munster Bank. The European Bank—originally the Union Bank of England and France—was voluntarily wound up in 1866. The Munster Bank, at first called the National Investment Co., Ltd., was established in Cork in 1864, with a capital of £1,000,000, increased in 1880 to £1,500,000. In 1870 it took over La Touche & Co.'s business. It suspended payment July 14, 1885, and went into liquidation. On the ruins of this Bank, the Munster and Leinster Bank was established in 1885. It took over the Dublin and Cork offices of the defunct institution, and subsequently purchased most of the branch premises.

The existing Joint Stock Banks have all adopted limited liability, with the exception of the Bank of Ireland. Bank of Ireland stockholders' liability is undetermined, as nothing is said in the Charter or subsequent Acts of Parliament on the subject. However, a joint opinion was signed, February 26, 1886, by Mr. (afterwards Mr. Justice) Kekewich, q.c., Sir Richard Webster, q.c., and Mr. Hornell, to the effect that "holders of Bank of Ireland stock are not liable for any debts or engagements of the Bank." The Bank of Ireland's subscribed capital is £2,769,231 15s. 5d., and is all paid up.

In 1825 (6 George IV., c. 79) the assimilation of the Irish and English coinage took place. The English shilling then ceased to pass in Ireland for 13d.; the half-guinea for 11s. 4½d.; and the guinea for £1 2s. 9d., which was their previous value, as settled by Proclamation of the Lords Justices and Privy Council, September 29, 1737. In 1828 (9 George IV., c. 80) Irish Banks were authorised to issue *unstamped* notes upon payment of a composition, and were thus put on an equal footing with banks in England. In 1841 (5 & 6 Victoria, c. 82) the equalisation of the Irish with the English stamp duties was effected. The result of this legislation was that the impost was more than doubled. In 1845 (8 & 9 Victoria, c. 37)

the Irish Banking Act, the latest Act on the subject, was passed. By this Act the only remaining vestige of the Bank of Ireland's monopoly (beyond being the Government bank) left by the Act of 1820, whereby banks with more than six partners were prohibited from transacting business in Dublin and fifty Irish miles therefrom, was swept away, and the whole country was thus thrown open to joint stock enterprise. Joint Stock Banks, so established, were then empowered to deal in bills at any less date than six months. The Bank of Ireland was to manage the public debt of Ireland free of charge: the interest on advances made by it to Government was reduced to $3\frac{1}{2}$ per cent., which became 3 per cent. in 1865; the offensive oath formerly required of its Directors was abolished: it was entitled, in the event of any bank relinquishing note-issue, to increase its note-issue by the amount relinquished; but the relinquishing bank could not thereafter resume the power so surrendered; Bankers uncertified by the Commissioners of Stamps and Taxes were prohibited from issuing notes; limitation of note-issue was provided for; Bank-notes for fractional parts of a pound, or for a pound and a fraction, were prohibited, under a penalty of £20 for each note issued; issuing banks were required to render weekly accounts of their note-circulation and stock of specie at the head office or principal places of issue to the Commissioners of Stamps and Taxes, who were also empowered to cause an inspection of books; public officers were allowed to become partners in banks; banks were bound to return once a year to the Stamp Office, Dublin, a list of the names, addresses, and professions of their partners; power was given to sue and be sued by their public officers; promissory notes or bills of exchange for sums under a pound were made negotiable; such are the chief provisions by which banking, as we now understand it, was settled to be conducted in this country. This Act also decided the doubts which had arisen, and on which the most eminent counsel were divided, as to whether Bank of England notes were legal tender in Ireland. It enacted (which will be information to many) that they were not, but that

"nothing in this Act shall be construed to prohibit the Circulation in Ireland of the Notes of the Governor and Company of the Bank of England as heretofore."

Bank of Ireland Notes are legal tender only in payment of Revenue.

PRESENT POSITION OF IRISH JOINT STOCK BANKS.

The deposits and cash balances in the Joint Stock Banks at the close of December, 1900, as shown in Table I., stood at £43,280,000 (exclusive of £1,960,000 Government and other Public Balances in the Bank of Ireland), as compared with £40,772,000 at the corresponding period in the year 1899, being an increase of £2,508,000, and showing an advance of £13,509,000, or 45 per cent., on the amount for December, 1887, since which period, comparing December with December, there has been a continuous annual increase. It will be seen from the Table that the amount under this heading in December last was also in excess of that for December in any of the twenty years preceding 1900; it was, in fact, the highest amount yet reached. In Table I. (A) the amounts of deposits and cash balances are compared by half-years; it shows that there was an increase in December as compared with June.

TABLE I.—Showing amount of Deposits and Cash Balances in Joint Stock Banks, on 31st December, 1880–1900, compiled from returns furnished by the several Joint Stock Banks in Ireland.*

Date.	Amount.	Yearly Increase.	Yearly Decrease.
	£	£	£
1880, 31st December,	29,746,000	-	795,000
1881, "	30,161,000	415,000	-
1882, "	32,746,000	2,585,000	-
1883, "	31,340,000	-	1,406,000
1884, "	30,627,000	-	713,000
1885, "	29,370,000	-	1,257,000
1886, "	30,172,000	802,000	-
1887, "	29,771,000	-	401,000
1888, "	30,979,000	1,208,000	-
1889, "	32,968,000	1,989,000	-
1890, "	33,325,000	357,000	-
1891, "	34,532,000	1,207,000	-
1892, "	35,375,000	843,000	-
1893, "	35,852,000	477,000	-
1894, "	37,607,000	1,755,000	-
1895, "	39,008,000	1,401,000	-
1896, "	39,238,000	230,000	-
1897, "	39,300,000	62,000	-
1898, "	39,438,000	138,000	-
1899, "	40,772,000	1,334,000	-
1900, "	43,280,000	2,508,000	-

* The names and the dates of foundation of the Banks, the combined statistics of which are included in Tables I. and J. (A), are as follows. Those marked with an asterisk (*) are Banks of Issue.

Name.	Estab-lished.	Name.	Estab-lished.
* Bank of Ireland,	1783.	* National Bank,	1835.
* Northern Banking Company, ...	1824.	* Ulster Bank,	1836.
Hibernian Bank,	1825.	Royal Bank of Ireland, ...	1836.
* Provincial Bank of Ireland, ...	1826.	Munster and Leinster Bank, ...	1885.
* Belfast Banking Company, ...	1827.		

TABLE I. (A)—Showing amount of Deposits and Cash Balances in Joint Stock Banks, in the months of June and December, in the years 1890-1900, compiled from Returns furnished by the several Joint Stock Banks in Ireland.

DATE.	Amount.	Increase.	Decrease.
	£	£	£
1890, 30th June,	33,061,000	93,000	—
" 31st December,	33,325,900	264,900	—
1891, 30th June,	33,700,000	375,000	—
" 31st December,	34,532,000	832,000	—
1892, 30th June,	34,565,000	33,000	—
" 31st December,	35,375,000	810,000	—
1893, 30th June,	34,637,000	—	738,000
" 31st December,	35,862,000	1,215,000	—
1894, 30th June,	35,430,000	—	432,000
" 31st December,	37,607,000	2,177,000	—
1895, 30th June,	37,491,000	—	116,000
" 31st December,	39,008,000	1,517,000	—
1896, 30th June,	38,758,000	—	250,000
" 31st December,	39,238,000	480,000	—
1897, 30th June,	38,564,000	—	674,000
" 31st December,	39,300,000	736,000	—
1898, 30th June,	38,973,000	—	327,000
" 31st December,	39,438,000	465,000	—
1899, 30th June,	39,840,000	402,000	—
" 31st December,	40,772,000	932,000	—
1900, 30th June,	40,387,000	—	385,000
" 31st December,	43,280,000	2,893,000	—

There are Six Banks in Ireland authorized to issue Notes, the statistics of which are included in this table. The total authorized issue of Notes for these Banks is £6,354,494, distributed as in the following Table:—

Name of Bank.	Amount of Authorized Circulation.
	£
Bank of Ireland,	3,738,428
Provincial Bank of Ireland,	927,667
National Bank,	852,769
Ulster Bank,	311,079
Belfast Banking Company,	281,611
Northern Banking Company,	243,440
Total,	6,354,494

IRISH SAVINGS BANKS.

Savings Banks, as we know them, are creations of this century. The first genuine Bank of the kind was established at Tottenham, in England, in 1804, by six gentlemen who acted as trustees, and allowed as much as 5 per cent. interest on sums exceeding one pound sterling which remained in their hands for one year. This well-meant venture, however, involved the trustees in loss, and was abandoned. In 1810 a well-organised Savings Bank, known as "The Parish Bank Friendly Society," was established at Ruthwell, and proved so successful that by the year 1816 it had led to the establishment of nearly eighty Savings Banks in England and Ireland. The year 1817 saw the first legislation on the subject—i.e., Acts 57 Geo. III., c. 105 and c. 130—intended to encourage and regulate Banks for savings in England and Ireland (these Acts were not extended to Scotland until 1835). The chief provisions of these Acts were—(1) Trustees were prohibited from making a profit out of these Banks; (2) They were bound to remit to the office for the reduction of the National Debt where "the fund for the Banks of savings" was opened all deposits exceeding £50 in the aggregate; (3) That office was to allow interest at the rate of £4 11s. 3d. per cent. per annum (whereas the Banks themselves mostly allowed their depositors 4 per cent.); (4) Not more than £50 could be deposited in any one year (in England, however, a depositor could deposit £100 in the first year). The next measure dealing with these Banks was an Act of 1824 limiting deposits to £50 in the first year and £30 in any subsequent year, and further providing that when the deposits of any person exceeded £200 no interest was to be allowed on the excess. In 1828 there was an important amending and consolidating Act which provided *inter alia*—(1) That the rules of each Trustees Savings Bank should be approved by the Commissioners for the reduction of the National Debt; (2) that the rate of interest allowed by that office should be reduced to £3 16s. 0½d. per cent. per annum, while depositors should receive from the Bank interest at the rate of £3 8s. 5½d. per cent. per annum; (3) that no depositor should be permitted to deposit more than £150, although the interest might be allowed to accumulate until the deposit reached £200. Five years after this Act (i.e., in 1833) there were in Ireland 76 Trustees Savings Banks, 49,872 depositors, and £1,380,718 deposits. The numbers for England in the same year were 385 Banks, 414,014 depositors, and £13,973,243 total deposits.

The Savings Bank principle was enormously developed by the establishment in 1861 (Act 24 Vic., c. 18), of Post Office Savings Banks, which at once became popular in England and Ireland, though in Scotland they have not rivalled the popularity of the Trustees Savings Banks. The statutory rate of interest under this Act was 2½ per cent. The security which the Post Office Savings Banks offer has influenced depositors in England and Ireland to forego the slightly higher rate of interest which the Trustees Savings Banks can offer.*

* Between 1817—the date of the first Savings Bank Act—and 1828, the Government allowed interest to the Trustees at the rate of £4 11s. 3d., while the average rate of interest yielded by Consols varied from £4 8s. 4d. to £3 6s. 1d. From 1828 to 1844 the Trustees received £3 16s., while Consols yielded from £3 15s. 3d. to £3 0s. 8d. From 1844 to 1880, Government allowed £3 5s. per cent., while the rate of interest on Consols varied between £3 10s. 7d. and £3 0s. 8d. From November 20, 1880, the rate of interest allowed was 3 per cent., which was again reduced in 1888 to 2½ per cent., at which it still remains.

The increasing popularity of the Post Office Savings Banks is well brought out in the annexed Table (Table I.), which refers only to Ireland:—

TABLE I.—Showing the Estimated Balances of Deposits, on 30th of June of the undermentioned years, in the Post Office and Trustees Savings Banks respectively in Ireland; and also total deposits for both.

Year.	Trustees Savings Banks.	Post Office Savings Bank.	Total Deposits in Savings Banks in Ireland.
	£	£	£
1833.	1,380,718	—	1,380,718
1844.	2,749,107	—	2,749,107
1860.	2,143,082	—	2,143,082
1870.	2,062,758	633,000	2,695,758
1880.	2,063,000	1,481,000	3,544,000
1885.	2,022,000	2,325,000	4,347,000
1890.	2,035,000	3,585,000	5,620,000
1895.	2,034,000	5,337,000	7,371,000
1900.	2,295,000	7,791,000	10,086,000

TABLE II. (A)—Showing the Number of Accounts remaining open in Post Office and Trustees Savings Banks in Ireland, on 31st December in each year of the period, 1884–1898.*

Year.	Trustees Savings Bank.	Post Office Savings Bank.	Total for Ireland.
1884.	52,655	124,973	177,628
1885.	50,236	135,777	186,013
1886.	49,775	147,193	196,968
1887.	49,994	158,848	208,842
1888.	49,242	172,305	221,547
1889.	50,455	185,360	235,815
1890.	49,643	198,790	248,433
1891.	49,276	212,076	261,352
1892.	49,005	225,823	274,828
1893.	46,505	235,944	282,449
1894.	47,510	259,870	307,380
1895.	48,123	280,499	328,622
1896.	48,911	301,976	350,887
1897.	49,518	322,486	372,004
1898.	49,725	342,070	391,795

* Statistical Abstract for the United Kingdom.

The Savings Bank Act of 1893 raised the maximum allowed to be deposited in cash in one year from £30 to £50, doubled the annual

maximum amount of stock allowed to be purchased (it had been £100), and increased the stock limit from £300 to £500. This legislation naturally resulted in a sudden and remarkable rise in the gross amount of deposits. While the deposits in 1893 were £16,000 less than these for 1892, these in 1894 were £616,000 in excess of the 1893 returns. In fact, since 1894, the total deposits in Post Office and Trustees Savings Banks in Ireland have increased by £3,459,000. These figures seem to denote that Savings Bank depositors are no longer exclusively drawn from the poorer classes, to whose interests alone prominence was accorded in the early Savings Bank legislation.

CO-OPERATIVE CREDIT ASSOCIATIONS.

The organisation of Co-operative Credit Associations in the rural districts of the South and West of Ireland was inaugurated in February of the year 1894, by the establishment of a "bank" at Doneraile, Co. Cork. The success of this trial institution, which was founded on what is known as the Raiffeisen system, naturally led to the creation of similar institutions in various parts of the country, and at the end of the year 1900 there were as many as seventy-five of these rural "banks" registered, and seventy-two in actual operation. Herr F. W. Raiffeisen, the creator of the "loan bank" system which bears his name, was born in the year 1818 at Haum, in Westphalia. Brought into sharp touch with the misery of the poor peasant cultivators of the Rhineland, through his official position as Burgomaster of several districts in the Westerwald, Raiffeisen determined to see if he could not alleviate their chronic suffering and poverty by the application of the principle of co-operation to their several needs. His first venture was a co-operative bakery, which was quickly followed by a co-operative cattle-purchase association. But successful as these experiments immediately proved—and such associations can now be counted by the hundred on the Continent—the lack of capital remained as a fatal flaw in the economy of the Westerwald peasantry. To supply this Raiffeisen started at Hammersfeld, in the year 1849, his first co-operative credit association. Not till five years later was a second "bank" started, and again Raiffeisen himself was the founder. In 1862 a third was formed; in 1868 a fourth. In 1896 no fewer than 2,169 Raiffeisen "banks" were at work in Germany alone. Their founder had then been dead for eight years, but the associations which "Father Raiffeisen"—as he is affectionately spoken of by his own countrymen—had originated, grew and are growing apace in every European country.*

The practical problem which faced Raiffeisen in the Westerwald was to supply a very poor agricultural people, who had two of the requisites of production—land and labour—with the third, to wit, capital. This he did by uniting the peasants as shareholders in loan associations, regulated on the principle of unlimited liability. In these societies every member is equally, jointly, and severally liable with every other member for the debts of the association.

* See "People's Banks," by Henry W. Wolff. London: P. S. King and Son.

This was the first safeguard of the "bank"—it secured care and caution in the admission of members, and constant supervision in the application of a loan. The second safeguard was afforded by the invariable rule that loans were only made for a productive purpose—a matter to be decided by the committee of the association—that is to say, by men intimately acquainted with the character and circumstances of the applicant for a loan, and each, individually, liable to be mulcted in case of his default. Raiffeisen was emphatic as to the necessity for restricting the operations of each association to a particular area—a village, a parish, a townland—and the wisdom of such a course cannot be questioned, having regard to the principles and aims of these organisations. The members of the committee, or other officials of the banks, get no salaries, and no dividends are paid—profits, when there are any, going generally towards the formation of a reserve fund. The tables given in this report must, therefore, not be judged from the standpoint of an ordinary joint-stock bank balance-sheet. The measure of the prosperity of these credit associations is not large profits or handsome dividends, but rather the extent to which the capital of the "bank" has subserved the needs of its members, and proved productive in their hands; and the absence of serious loss. With three exceptions, all the credit associations in Ireland are Raiffeisen "banks," and consequently I need not do more here than allude to the well-known fact that there have been in Germany and Italy other apostles of co-operative credit in town and country whose fame is only second to that of Raiffeisen himself. Herr Schulze—called Schulze-Delitzsch from his birth-place—organized his first credit association in 1850—a year after the first Raiffeisen bank was established at Flammersfeld. The Schulze "banks" are savings banks as well as credit associations, and their growth has been mainly in Continental towns. Their founder wished to bring credit and the opportunity for thrift to the doors—not of a rural peasantry—but of the artisans and small shopkeepers of town populations. The success of the Schulze-Delitzsch associations on the Continent has been remarkable. There are at the present moment several thousands of these organisations in Germany alone, and they have spread to Austria, Italy, and France. Still another modification of the system of co-operative credit is found in the "Banche Popolari," which Italy owes to the genius and zeal of Commendatore Luigi Luzzatti. Luzzatti started his first People's Bank in Milan in 1865. Avowedly inspired by the idea of Schulze-Delitzsch's associations, Luzzatti considerably modified the German's conception with a view to meeting the special needs of Italy. It is enough, in this place, to mention, in regard to these modifications, Luzzatti's rejection of the principle of unlimited liability. The "banche popolari" were town "banks"; Italy needed also its rural credit associations. To supply these was the mission of Signor Wollemborg, a Venetian landlord, whose immediate desire was to rescue his tenantry and their neighbours from the thralldom of usurers. In June, 1883, the first Italian rural "bank" was organised. In essentials the "casse rurali" of Italy are Raiffeisen associations. An enormous impetus was given to the spread of the rural "banks" of Italy by the energy and ability of Father Cerutti—the parish priest of Gambarare, in Venetia—who since 1890 has been the promoter of hundreds of these institutions in Venetia alone. In order to give some idea of the character of the transactions of these rural credit associations in Ireland, I extract the following

typical cases from the Fifth Annual Report of the Irish Agricultural Organisation Society:—

"A man borrowed £2, which enabled him to retain a sow which otherwise he would have been forced to sell for £2 10s. to meet a pressing need. This sow brought him a litter of ten, which he sold a couple of months after, making £5 on them. The sow is still in his possession for future breeding—we hope to prove equally prolific and profitable. Another man writes:—'The loan, £3, which I borrowed from the Kilcommon Bank on the 22nd of August, 1898, I applied as follows:—On the 27th of August I purchased three young pigs for £1 15s. On the 15th February following I sold two pigs at £3 15s. I have kept one, a sow, for breeding. She is now within three weeks of young ones, and is valued for £4. The balance of loan, £1 5s., enabled me to hold over sale of a calf, which at the time would only have fetched £1 10s. This is still in my possession, and is well worth £3. The feeding for pigs would have been worthless to me without them, the potatoes being small and black.'

"From a County Galway Bank comes the following instance:—A member borrowed £2 10s. in July last, for which he bought two young pigs. He realised £6 by the sale of these in March, and he then bought for £3 a young sow, which, together with her young, are now worth about £10.

"The secretary of another rural bank writes that among other things the Society was 'instrumental in purchasing twenty spraying machines for sixty farmers (every three joined to procure a machine). These farmers maintain that the spraying improved the produce of their potato crop by one-half. The farmers in this parish plant on an average about 1½ acres, and from this you can easily calculate what good the bank has done. I may add that the machines were lent to others, so that in fact a good many more were benefited through the means of the bank.' Another case from the same bank is typical:—A woman borrowed £2. For this she bought young pigs. In six months she paid back the loan and had a balance, after selling the pigs, with which she paid her rent. The secretary also mentions in his letter that an interesting and prominent figure—the goombeen man of the place—whose fame was not merely local, is now getting a wide berth from the farmers. We understand that a loan of £3, borrowed by a poor farmer from this extortioner, had cost over £8 in interest in as many years. From Spiddal we furnish the following instance:—The borrower obtained a loan of £3 to purchase one loom and to repair another. He and his brother began work as weavers, and were able to repay the amount of the loan in less than three weeks. Without the loan they would both be idle. A somewhat similar case is reported from Belmullet:—The borrower was a shoemaker, and could not start work for want of funds. The loan was £3. In one month his profits amounted to the loan."

The following Tables show that a large percentage of the rural banks are in Congested Districts. There are in Mayo as many as 16 of these co-operative credit associations, in Galway 15, in Donegal 8, in Wexford 4, in Clare 3, 2 each in Queen's County, Roscommon, Cavan, and Waterford, and 1 in each of the Counties Cork, Tyrone, Kerry, Sligo, Tipperary, Armagh, and Down. It will be noticed that 3 of the 4 "banks" registered in the County Wexford do not admit the principle of unlimited liability which is characteristic of the true Raiffeisen "bank." The small capital necessary to organise a co-operative credit association is generally raised locally—coming from the Joint Stock Banks or a few wealthy patrons. In some districts, however, the committees of such associations have taken advantage of the power of the Congested Districts Board to grant loans for the advancement of agriculture to borrow from the Board, and deposit the advances thus obtained with the "bank." In 1897 the Congested Districts Board voted a sum of £2,000 to be lent out in sums of £50 to agricultural "banks" in Congested Districts, but it was found that the constitution of these associations precluded their borrowing from persons other than their own members. This disability was removed in 1898 by the passing of the "Societies Borrowing Powers Act," introduced by Mr. Horace Plunkett into the House of Commons.

The following statement shows the growth of co-operative credit associations in Ireland since 1895.

CO-OPERATIVE CREDIT ASSOCIATIONS IN IRELAND, 1895-1900.

	1895, 31st March.	1896, 31st March.	1897, 31st March.	1898, 31st March.	1899, 31st March.	1900, 31st Dec.
No. of Associations, ...	1	2	3	15	48	75

The membership has grown from less than 50 in 1895 to 2,461 on December 31st, 1899. The nett loss on loan transactions involving close on £9,000 has been a sum of £1 9s. 3d. A very good record for punctuality in repayment of loans has been established. Thus, in one society in Mayo, the largest in point of membership of any in Ireland, where in 1898-99 as many as 536 loans were granted, only twelve members were one week late in repayment. When it is remembered that there are no paid officials in these credit associations, and that all the services of management and control are cheerfully given without reward, the educational value of such organisations cannot be disputed.

EDUCATION.

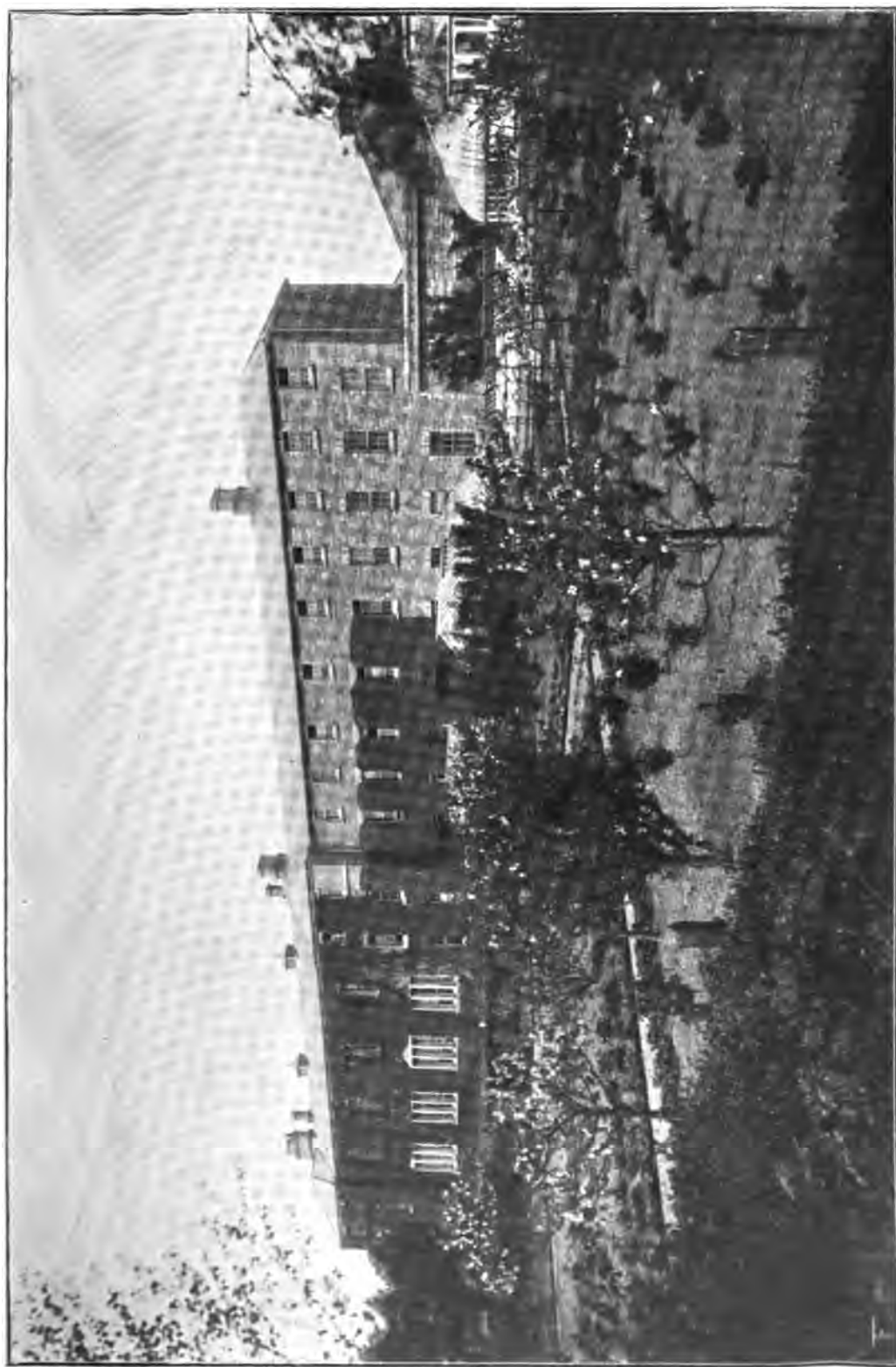
AGRICULTURAL EDUCATION—TECHNICAL EDUCATION: SCIENCE—ART.

[* * NOTE.—*In this chapter will be found brief historical sketches of what has been attempted and done in Ireland towards promoting technical instruction in regard to agriculture, industry, and the arts and crafts. The consideration of the whole question of literary instruction—primary, secondary, and university—though of the first importance, is beyond the scope and purpose of this work. In regard to the very interesting efforts of the Board of National Education to graft on to their literary programme a system of agricultural instruction, no better account exists than that contained in a letter addressed by the late Sir Patrick Keenan, K.C.M.G., C.B., Resident Commissioner of National Education, to His Excellency the Earl Spencer, K.G., then Lord Lieutenant of Ireland, in January, 1883. This document is at once authoritative and succinct. It was published originally in the Second Report of the Royal Commissioners on Technical Instruction [C.—3981,—I.], Vol. II., pp. 271–281; and it is reprinted here as giving the best brief history of a remarkable and instructive experiment.—EDITOR.]*

AGRICULTURAL EDUCATION IN IRELAND, 1826–99.

The first movement in the direction of agricultural education was made in 1826 by a committee of the Ulster gentry, at a place called Templemoyle, in the County Londonderry. This committee collected and subscribed large funds, which were expended in the farming stock and the necessary buildings of a considerable agricultural institution. From fifty to seventy agricultural pupils were annually received into the Templemoyle School. The stipend was only from £10 to £12 a year for board and instruction; but the school, on the other hand, commanded the free labour of the pupils. For nearly a quarter of a century it was self-supporting. But, in the long run, mainly as an effect of the famine of 1847, the committee became embarrassed in their finances, and, to relieve themselves from further responsibility, connected the institution, in 1850, with the Board of National Education.

The Templemoyle School, in the course of its operations up to 1850, had received and educated about 800 pupils from different parts of England and Scotland, as well as Ireland. Concurrently with the operations of the Templemoyle School came the first attempt of the National Board to diffuse a knowledge of agricultural science amongst the people. It suggested itself to the Commissioners, when Parliament was first invited by them to vote funds for agricultural education, that the most efficient plan to spread a knowledge of sound principles in agriculture would be to make it



The Albert Agricultural Institute, Glasnevin, Co. Dublin.

a subject of instruction in the Normal School for the Training of Teachers in Marlborough-street. This was in the year 1838.

A lecture upon agriculture was accordingly given to the students of the Normal School daily. Without expository instruction upon the farm, it was, however, conceived that this lecture would be productive of somewhat comparatively barren results.

It was, therefore, determined by the Board in the same year, 1838, to take a farm at Glasnevin, in the vicinity of Dublin, to which the literary students in training might have easy access, and upon which they might see, practically carried out, the plans and systems of agriculture and horticulture recommended in the daily lectures. This, in point of fact, was the origin of the agricultural department of the Irish national system of education. It is particularly important to observe this. The Glasnevin farm was not designed merely to bring up a race of skilled stewards and skilled practical farmers. Its original and primary purpose, on the contrary, was simply to qualify the ordinary elementary schoolmasters to instruct their pupils in the theory of agricultural science, and, where practicable, in school gardens and small farms attached to the national schools, to illustrate their teaching by reference to the operations on the gardens and farms. The Commissioners explicitly stated at the time, in their report presented to Parliament, that their object was not to teach trades, but to facilitate a learning of them by explaining the principles upon which they depend, and by habituating young persons to expertness in the use of their hands.

The function of Templemoyle was exclusively to produce skilled farmers; that of Glasnevin, as I have said, was mainly to qualify elementary teachers to instruct the pupils of rural schools in the principles of agricultural science. I say *mainly*, for the Commissioners entertained the idea that, without detriment to the interests of the schoolmasters, young men intending to become farmers, stewards, and colonists, might also be received as pupils in the institution. But the difficulty of directly, themselves, managing a farm almost immediately occurred to the Commissioners. How to make the farm *pay*, and how to make it *teach*, cropped up as conflicting problems. It is not surprising, therefore, to find that they soon shrank from the responsibility of farming upon their own account; and in the following year (1839) they accordingly rented the farm to their agriculturist, an arrangement which lasted until 1847, when, under the light of experience, they themselves took courage to resume its working. The idea of engrafting agricultural instruction upon the ordinary curriculum of an elementary school was accepted in the country with positive enthusiasm. Landlords and others who, on religious and political grounds, hated the national system, turned invariably to this feature of the operations of the Board with the greatest favour.

The Devon Commission, in 1843, hailed the project, and recommended the establishment of schools for agricultural instruction throughout the country. Agricultural societies and leading public men expressed their approval of the proposals with unstinted cordiality. But even at so early a period as 1848 an adverse criticism from so influential a quarter as the Select Committee of the House of Commons on Miscellaneous Expenditure was communicated to the Commissioners. This committee expressed grave doubts as to

the policy of engrafting an agricultural department upon a national system of Primary Education. The Commissioners, however, entertaining the conviction that they were right, took pains to assure the Government that they anticipated great national advantages from the system of agricultural education which they had conceived for the country; and at the same time they announced their determination to give stability to their agricultural system by the appointment of an inspector who should have the superintendence of the Glasnevin farm, and also have the general guidance of such agricultural schools as from time to time were springing up in the country. On the

**Scheme of Itinerant
Instructors.**

other hand, the popular sentiment in support of the development of agricultural education became more demonstrative from day to day. The Lord Lieutenant (Lord Clarendon) appointed, in 1848, a body of agriculturists, called Practical Instructors, to go about amongst the farmers, especially in the districts which had been ravaged by the famine, to urge them to improve their system of cropping, and to induce them to undertake the drainage of their farms. The work of these practical instructors was eminently educational. Hence I think it right to refer to them. And I must at the same time say, from a personal recollection of their institution and labours, that no more fruitful experiment in the material interests of the country was ever attempted. It was through the agency of this corps of practical instructors that green cropping as a systematic feature in farming was introduced into the south and west, and even into the central parts of Ireland.

The acclamation of Irish opinion in favour of agricultural improvement to a large extent beguiled the Board. Instead of mainly directing their exertions, as they originally intended, to the agricultural instruction of the literary students in training in the Normal School, they resolved, through the foundation of provincial model farms, to establish a great system of technical education for the instruction of young men as farmers and land stewards. From time to time they took leases of farms, twenty in all, in different parts of the country; and (including Glasnevin) at a cost of some £115,000 erected residences and farm buildings. At each of these farms there was provided adequate accommodation for a number of resident agricultural pupils, and, besides, suitable arrangements were made for their technical education. The only coincident purpose which existed between these farms and the farm at Glasnevin was that, wherever a literary model school, under the exclusive management of the Commissioners was established adjacent to the farm, the literary pupil teachers and their head master lived upon the farm and pursued the old idea as to agricultural training which prevailed at Glasnevin. For some years the twenty country farms, as well as the Glasnevin farm, enjoyed an immense popularity. Four of these farms were in operation in 1849, and in 1856 they were all in complete working order. Besides these model farms, which were the property of the Commissioners, and entirely supported by them, numerous farm schools were opened under private influence from year to year which obtained aid from the Board towards their organization and working. In the year 1850 the Commissioners, with the concurrence of the Poor Law Board, determined to offer substantial attractions to the guardians of the poor law unions throughout the country to encourage agricultural education in the

workhouse schools. Wherever there was a farm of suitable dimensions connected with a workhouse, the Commissioners offered a gratuity to the teacher of the school for success in the management of the farm, and for giving efficient instruction in agricultural science to his pupils.

But an agitation, originated by the Liverpool Financial Reform Association about a quarter of a century ago, **Agitation in England** arose against our whole agricultural system. **against State Aid.** This association disputed the right of the State to train up farmers and stewards at the public cost. In Parliament the association, especially amongst advanced free-traders, had many influential exponents. The Government, from time to time, was harassed in its defence of the system. Successive Chief Secretaries, in deference to the views of Parliament, barely tolerated its continuance. Mr. Herbert, Mr. Cardwell, and Sir Robert Peel, were absolutely hostile to it. Mr. Cardwell especially directed his hostility to the countenance given by the Board to agricultural instruction in the workhouse schools at the expense of Parliament, and distinct from its support from the rates, and strongly and successfully urged the Board to abandon this branch of their agricultural system.

This was in 1862. The workhouse experiment thus lasted only twelve years. The greatest number of workhouse schools having agricultural departments attached in any one year during the twelve years of the experiment was seventy-nine. The Board, recognising this great change in Parliamentary opinion, held their hands, and determined not to add to the number of their farms. They even tried to avert hostility to the system by renting *nine* of the existing farms to the agriculturists in charge of them, with a view to reducing the cost of the agricultural department. But this latter experiment proved to be a great embarrassment to the administration, and had to be abandoned. In 1870 the Royal Commission upon Primary Education, presided over by Lord Powis, recommended:—

“That the position of provincial and district model agricultural schools should be revised by the Commissioners of National Education, and that their number should be reduced.”

The old Templemoyle School, to which I referred in my opening remarks, died out in 1866. In the beginning of 1872 the agricultural department was at a low ebb in popular favour. It had been proscribed by Chief Secretary after Chief Secretary, and it at all times had to encounter the fiercest hostility of the Treasury, who regarded it as a baneful excrescence upon a primary system of education. Besides, the Royal Commission had spoken, as I have quoted, in anything but a sympathetic fashion.

You, however, my dear Lord Spencer, in your former Lord-Lieutenancy, hesitated, in face of the accumulating opposition, to believe that agricultural improvement through all agencies was hopeless, and in the spring of 1872 submitted, as you will remember, through your private secretary, Mr. Yates Thompson, the following project to the Board:—

“I am to state that his Excellency has long taken an especial

interest in the welfare of the very numerous class of Irish small tillage farmers, and has held the opinion, which personal observation of their condition and prospects in various parts of the country has amply confirmed, that their present style of farming and the management of their homesteads admits of considerable improvement. It appears that more than half of all the holdings in Ireland, namely, 317,457 out of 608,864 (from both of which figures, however, some deductions must be made for the cases in which two or more separate holdings, being in the occupation of the same individual, are enumerated separately), were valued in 1886 at less than £8 a year. His Excellency thinks it will not be disputed that in a vast majority of cases these holdings are imperfectly cultivated, and that the habitations upon them are, speaking generally, both inferior and ill-kept. Under these circumstances, and considering that the settlement of the land question, under the Act of 1870, has turned the attention of the public to the general condition of the farming classes, and has given an impetus to many improvements in the management of farms, the present has seemed to his Excellency a favourable occasion for an endeavour to direct attention to this very large and important class of agriculturists. In doing so, I am to state that he does not desire to raise or pronounce any opinion on the very difficult question of the proper size of the farms. He would carefully avoid that, but at the same time he is confident that that most interesting question cannot be satisfactorily solved in this country until the small farmers of Ireland avail themselves of the means at their disposal for careful tillage much more extensively than they do now. Among the methods employed to promote good agriculture, his Excellency is of opinion that nothing has been more calculated to benefit the small farmers than the school farms or gardens under the inspection of the National Board of Education, which, he is glad to observe, are gradually increasing in number. Accordingly, it has occurred to him, more in the hope of seeing his action, if successfully carried out, imitated by others than from any notion that so small a contribution can have any very considerable effect in itself, to offer, on certain conditions, prizes to be adjudged in connection with certain of these school-farms. He has selected eight of them in various parts of the country, viz. :—

“In Leinster—Garryhill and Ballinvally.

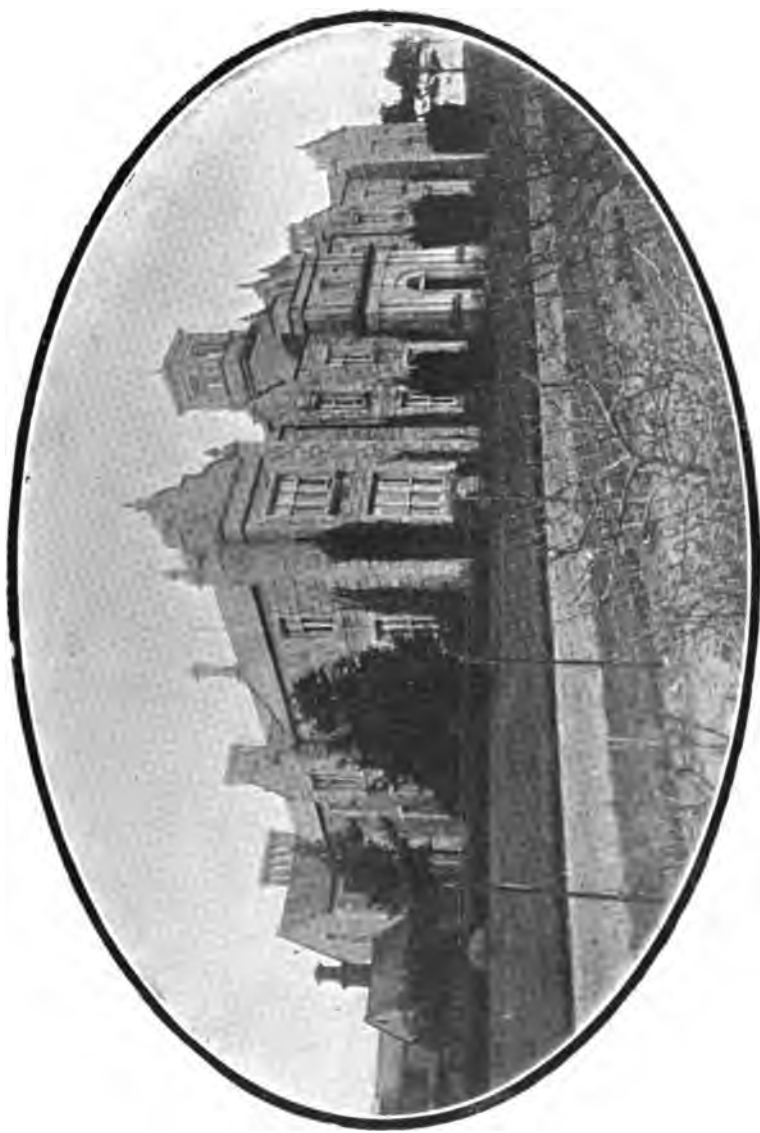
“In Ulster—Cornagilta and Parkanour.

“In Munster—Tervoe and Grange.

“In Connaught—Castlehackett and Killasolan.

And, taking round each of them a radius of five or six miles, he proposes to give annually for the next five years three prizes, to be called “The Spencer Small-farm Prizes,” and consisting of £3 10s., £2 10s., and £1 10s. respectively, to the occupiers of the three holdings in each of the areas above described, and valued under £8 a year, which shall be adjudged to be the most commendable on the score of (1) the neatness and cleanliness of the house; (2) the amount and quality of the produce of the land; (3) the character and condition of the live stock of all sorts, from horses and cows down to poultry and bees; (4) any other circumstances that may attract the favourable attention of the judges.”

The Commissioners received this scheme with much satisfaction, and unanimously resolved to place at the disposal of your Excellency



Munster Institute, Cork.

their agricultural inspectors for the adjudication of the prizes. In each of the five years of the experiment the Commissioners received a report from their inspectors which satisfied them that the scheme proved to be a great success, not only in encouraging the small farmers to make the most of their humble resources, but in stimulating the landlords to look with a more earnest solicitude upon the industry and improving fortunes of their small tenants.

But whilst your prize scheme was still in its infancy, a Departmental Committee, 1873-4, under the presidency of Mr. W. H. Gladstone, M.P., was appointed by the Treasury to investigate (along with other Irish Departments) the affairs of the National Board of Education. The agricultural branch of the National system naturally came under the survey of this committee; and they reported, *inter alia*, that, exclusive of Glasnevin, they found that there were in the other twenty agricultural schools but thirty-three resident pupils.

This Committee then recommended that:—

“These buildings (the model farm buildings) are much too large to suit ordinary tenants of the small portions of land attached to them, and there will, therefore, be difficulty in disposing of the farms on advantageous terms; but we consider that their retention only involves the continued outlay of public money without any adequate return; and as the general opinion appears to be that their alienation will be no loss to agricultural education in the country, we entirely agree with the Royal Commissioners that these farms should be got rid of as speedily as possible.”

The upshot of these recommendations of the Departmental Committee is that, under Treasury sanction, we have sold nine of the farms, surrendered to the landlords seven, relet one, and handed over two others to local management. There are thus left only two, viz., the Munster farm at Cork, and the Albert Institution, Glasnevin.

The case of the Munster farm is interesting. Just as the Commissioners were taking steps to get rid of it a movement was set on foot in Cork to reanimate it, and to make its operation a lever in the revival of the butter trade of Cork. The

The Munster Institute, Cork.

following extract of a letter addressed by the Commissioners to the Lords of the Treasury on the 24th of June, 1880, will best explain the views of the Board, and the new development agricultural education had a likelihood of making:—

“The Board was led to understand that a movement of some importance was on foot in the city and county of Cork, having for its special object the diffusion of agricultural science generally, and especially a knowledge of what is technically called ‘Dairy-farming.’ The great agricultural trade of the South of Ireland is butter-making. In former times the butter of the Cork market was esteemed very highly throughout the United Kingdom. In recent times the Cork ‘brand’ declined considerably in public favour. The movement referred to has for its special object a revival of the distinction which the Cork butter formerly enjoyed. This movement is represented in Cork by a committee of influential persons connected with the farming interests of the South of Ireland. The Commissioners learned that a committee was anxious to co-operate with them in

making the model farm a centre for important agricultural experiments, a school for practical instruction for agricultural students, and a training establishment for the education of dairymaids. The Board could not be indifferent to such a proposal, and they therefore cordially entered into its consideration, in the sanguine expectation that even at the eleventh hour agricultural education might in this instance prove a success."

Luckily, this appeal gained the Treasury sanction. The local committee, in augmentation of the Parliamentary grant in the first year, subscribed £526. The experiment so far has been eminently successful. Since 1880 over a hundred dairymaids have undergone a course of training in the schools of at least six weeks' duration in each instance. The butter which was made at the school almost immediately obtained a high reputation, and commanded the best price. At the Birmingham Dairy Show in 1881, the success of the school produced quite a sensation in the agricultural world. The prizes which it obtained at the Show were First, Second, and Third, in the fresh butter classes.

Subsequently, in the same year, at Islington, other important prizes were awarded to the school, viz. :—First and second prizes in the fresh butter classes, special prize for salt butter, special prize given by the judges for excellency of entries, and also the champion cup presented by the Lord Mayor and Corporation of the City of London for the best butter exhibited. The young women who are educated as dairymaids in the school are chiefly the daughters of Munster farmers. The stipend paid by each for the six weeks' course is only £3. As I have said, the Cork butter trade had declined in its reputation. The success, so rapid and complete, of this school is said already to have increased the value of the dairy produce of Munster by so large a sum that I hesitate to record it. But there can be no doubt whatever that this propitious experiment has proved not only to be a turning-point in the fortunes of Irish agriculture, but a practical lesson to the whole population of Munster that education is not a device of statesmen to make people only masters of books and of sciences, but that, wisely directed, it is all the while a certain means of promoting their material prosperity.

For many years, however, it had occurred to the Board that, whilst every rural National school in the country could not be organized in the strict sense as **Agricultural Instruction in Rural National Schools.** an agricultural school, every such school might readily be made to become an efficient instrument for the inculcation of sound instruction in the fundamental principles of agricultural science. To this the Commissioners looked with more hope than even to the successful working of a limited number of expository (model) farms. And that there might be no misconception about their views, they laid it down that agriculture in a prescribed course should be a subject of obligatory instruction, like reading, or writing, or arithmetic, in the three upper classes (standards), viz., the fourth, fifth, and sixth of every boys' rural school.

To encourage the teachers to promote the success of this project a special results fee of 4s. or 5s., according to class, is awarded for proficiency. In 1881 the number of boys examined in agriculture under this provision was 37,476, and the number of "passes," that is, of boys who earned the results fees for their teachers, was 18,517.

But whilst thus stimulating agricultural knowledge in all rural schools it was felt that, if the teachers themselves could become possessed of something more than the mere book-knowledge of the science of agriculture, which every master must exhibit in order to obtain a certificate of classification as a National teacher, our new agricultural experiment, the most hopeful we had hitherto tried, would be all the more likely to prove a success.

The male students in the Normal College, Marlborough-street, about 100, each year get sound practical instruction upon the Glasnevin farm throughout the period of their training. So far as *they* are concerned, there is no gap or want in their agricultural training. But to help other teachers to obtain the same advantages it was arranged, in 1881, to bring up classes of masters from year to year, of about fifty in each class, to Glasnevin, at the public expense, for a special practical course of six weeks' duration. In 1881, fifty-two, and in 1882, seventy, attended at Glasnevin for this special purpose. The report of the superintendent is highly favourable to this experiment.

But, besides the results fees which we grant for mere book-knowledge of agricultural science, we give, in the case of ninety-three National schools to which small farms or cottage gardens, the property of managers of schools, are attached, result fees, not only for the book-knowledge evinced by the pupils, but for (a) the degree of merit which the cultivation of the little farm or garden evinces, and (b) the practical powers of the pupils as agents in the working of the farms.

This part of the system is working admirably, and is a vast improvement upon the plan, in force until 1875, of a uniform salary of £5 or £10 to the teachers of those schools. The fees for the book-knowledge of agriculture in the ordinary National schools are provided in the estimate for National Education generally. In 1881 these fees amounted to £2,309 14s. 6d. For the work of the Agricultural Department proper, *i.e.*, for the Glasnevin and Munster establishments, and the ninety-three small farms or cottage garden schools, a separate estimate is presented to Parliament. This year (1883) it amounts to £4,030. The expenditure upon model farms was greatest in 1853-4, when, exclusive of interest on the cost of the farm buildings, it amounted to £12,250.

In conclusion, I should perhaps observe that at the Glasnevin and the Munster farms ordinary agricultural male

Conclusion.

students continue to be received for practical and scientific instruction in agriculture. The number of students in each of these institutions at present [*i.e.*, January 1883] is :—

I. Munster school :—

Last session there were eight students, all residents, and paying £7 10s. for each term of four months.

II. Glasnevin school :—

- (a.) Twenty-five free students (resident) who obtained their places by competitive examination.
- (b.) Eighteen students resident and paying £7 10s. for each term of four months.
- (c.) Four students (extern) paying £2 for each term of four months.

The following analysis of the destination of seventy-one free students who attended the Glasnevin Farm since August 1881, if not entirely satisfactory, is curious and interesting:—

Land surveyor, valuator, &c.,	...	...	...	4
Land steward,	...	...	...	6
Farming at home,	...	...	...	19
Gardener,	...	...	...	1
Herd,	...	...	...	1
Farm labourer, &c., at Albert Institution,	...	...	...	1
Engaged in charge of engine at Albert Institution,	...	...	...	1
National teacher,	...	...	...	4
In normal school for training teachers at Drumcondra,	...	...	...	2
Other employment,	...	...	...	4
Emigrated with a view to farming,	...	...	...	12
Unknown,	...	...	...	15
Died,	...	...	...	1
				71

Except by the allusion which I made to Lord Clarendon's Practical Instructors of 1848, and to your own [*i.e.*, Earl Spencer's] prizescheme of 1872, I have confined my remarks in this letter to the fitful fortunes of agricultural education as administered by the Commissioners of National Education. But the story of Irish agricultural education would be incomplete if no reference were made to the operations of the industrial and reformatory schools, which not only in boys', but in girls' schools, have embraced agricultural and dairy instruction in their industrial curriculum, and, I believe, with very marked success—a significant reproach to the panic-born policy which forced the National Board to withdraw their grants, in 1862, for agricultural education from the workhouse schools.

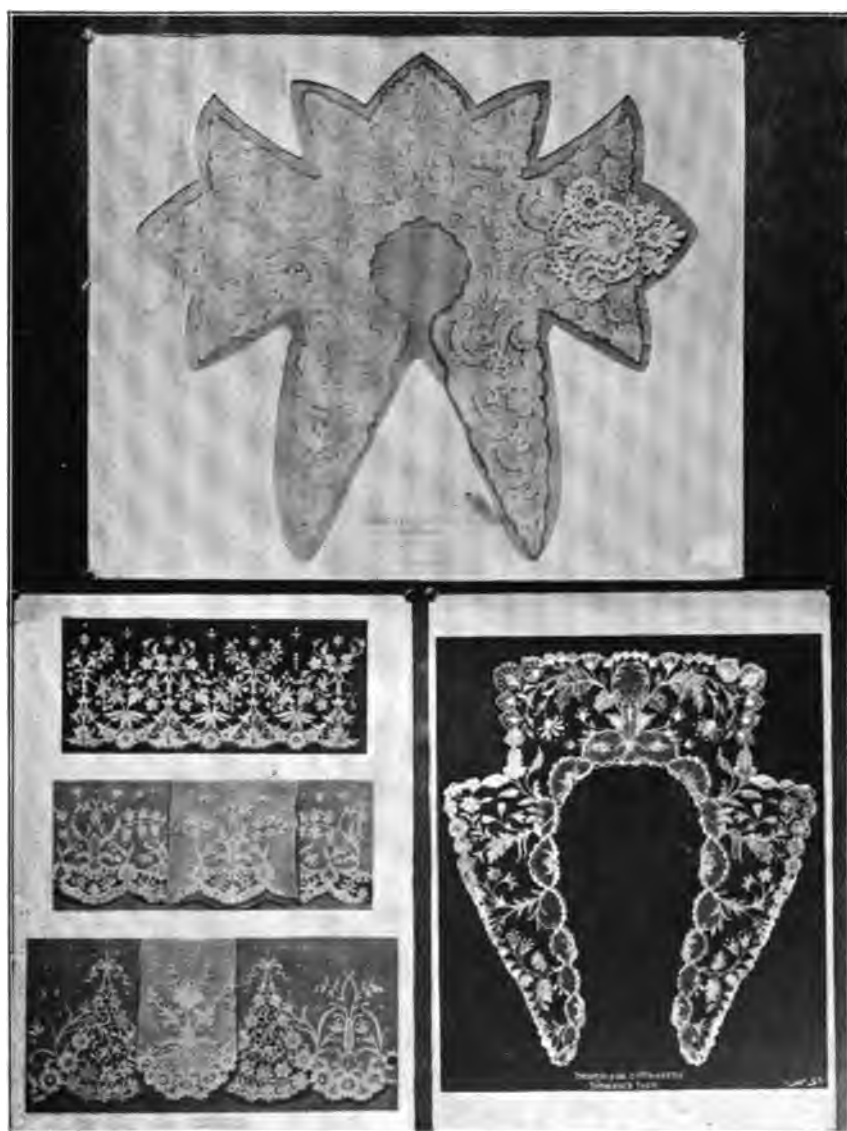
ART INSTRUCTION IN IRELAND.

There are few Schools of Art in the United Kingdom which can boast a greater antiquity than the Metropolitan School of Art, Dublin. The Royal Dublin Society was (as stated elsewhere in this volume) founded in the year 1731 for improving "Husbandry, Manufactures, and other useful Arts and Sciences"; and we find that on the 18th May, 1746, it decided that, "Since a good spirit shows itself for drawing and designing, which is the groundwork of Painting, and so useful in manufactures, it is intended to erect a little academy or school for drawing and painting, from whence some geniuses may arise to the benefit and honour of this kingdom, and it is hoped that gentlemen of taste will encourage and support so useful a design." This modest announcement, expressed in the rather quaint phraseology of the period, marks the commencement of the School of Art. In 1748 we find that the "Society agrees to pay Mr. West, who keeps a drawing school in George's-lane, his usual allowance for teaching the poor boys." In 1763 the Society's Art School was located in the Society's house, Shaw's-court, Mr. West being the master. Collections of casts and water colour drawings appear to have been presented to the School from time to time; many of these are at present in the School and Museum. In the year 1815 the Society purchased Leinster House. The present gallery of the School of Art appears to have been originally intended for a museum, and was built about the year 1843. The first public distribution of prizes to pupils of the School of Art took place on the 8th December, 1842, under the presidency of His Excellency the Lord Lieutenant. On the 30th January, 1845, Mr. West, the then headmaster of the Art Schools, was superannuated. His services, together with those of his father and grandfather, appear to have extended over a period of ninety years. In 1848 the newly-established Government School of Design at Somerset House, London, presented the Art School with 100 casts of ornament, and from this time forward we shall find that the School has ceased to exist under the exclusive control of the Royal Dublin Society. It appears, however, that the wish expressed in the resolution of 1746 was in a large measure realized, as the records of the Society show a long list of names of artists who, having studied in the School, rose afterwards to eminence. Amongst them we find men such as Ashford, Cuming, and Cregan, all of whom became presidents of the Royal Hibernian Academy. We also find Shea, afterwards president of the Royal Academy; Comerford, the miniature painter; James Barry; Foley and Hogan, sculptors; Mossop, the medallist, and many more; indeed, it is no exaggeration to state that there is scarcely an Irish painter, sculptor, or architect, from the period of the inception of the School, who did not receive portion, at least, of his art education within its walls. Up to the year 1849 the Society had four schools, or departments, for figure, landscape and ornament, architecture, and

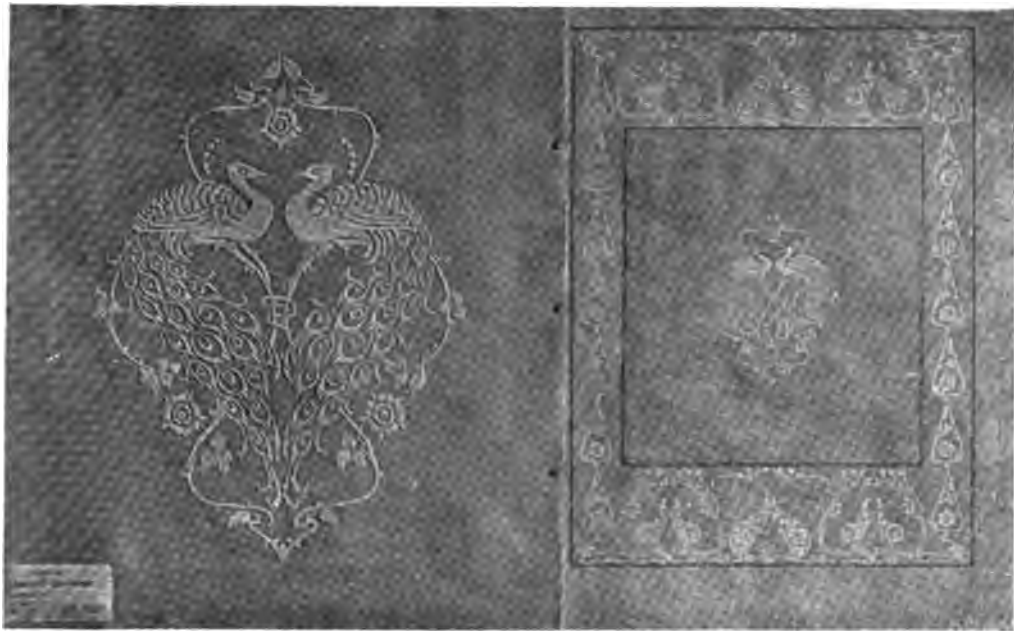
modelling. In this year the School was converted into a so-called School of Design, under the Board of Trade. Mr. Henry M'Manus was appointed headmaster, and the gallery was handed over for the use of the School; it has since remained in its occupation. An evening school for males was now for the first time established, also day classes for female students. Up to this period the instruction given was gratuitous, and the School appears to have been attended by a daily average of 100 students. During the session 1849-50 the School was attended by 743 students, being apparently the largest number on record attending during any one session. In the year 1860 the Society accepted the Taylor trust for the promotion of art in Ireland. From this time onward the School was in connection with the Department of Science and Art, although not directly administered by it; but in the year 1879, after a Royal Commission had been held to inquire into the advisability of establishing a separate Science and Art Department for Ireland, the School was, along with other institutions such as the Botanic Gardens, National Library, &c., formally taken over by the Government. On the 1st April, 1900, the School, along with the other science and art institutions in Ireland, passed under the control of the new Department of Agriculture and Technical Instruction for Ireland.

The Reports of the School from the year when it was taken over by the Government bear testimony to the fact that the work done has been of a high order. Some years ago the feeling throughout the country generally was to the effect that sufficient attention to what may be called the industrial side of art education was not given by the Science and Art Department. It was said that too many students were being educated as mediocre artists, that the question of design was being lost sight of; and in response to this feeling as expressed in many quarters, the Department made such changes in the arrangements for its examinations and competitions as favoured the direction towards the study of applied design in the Schools of Art. The Metropolitan School of Art was not slow in responding to the changed conditions, and an examination of the Reports for the past ten years or so will afford an index to the work of the School in various directions. After the Cork Exhibition of 1883, a great impetus to lace-making and the improvement of lace design took place in Ireland. In 1890 a special class for the study of lace design was formed in the School, and this has increased to an extent which renders more room for this class desirable. A reference to the prize lists since 1890 will show that many medals and prizes have been gained in the national competition for lace designs. In 1890, five prizes for lace design were won; in 1891, eight prizes, including two silver medals for lace; in 1898, one gold medal, one silver medal, and seven book prizes for lace. The Hungarian Government, it may be mentioned, purchased two of the lace designs this year. In 1900, thirteen prizes and medals were gained for lace design. But it is not alone these prizes gained in the national competition which evidence the success of the School in this direction, but the fact that the demand for lace designs from the various centres throughout the country has been considerable.

The principle which governs the instruction given in lace designing is, that while the students are taught to study the construction of the patterns in the antique laces of the best periods, and are encouraged to make themselves acquainted with the technical requirements of the fabric by learning to make it, yet they must



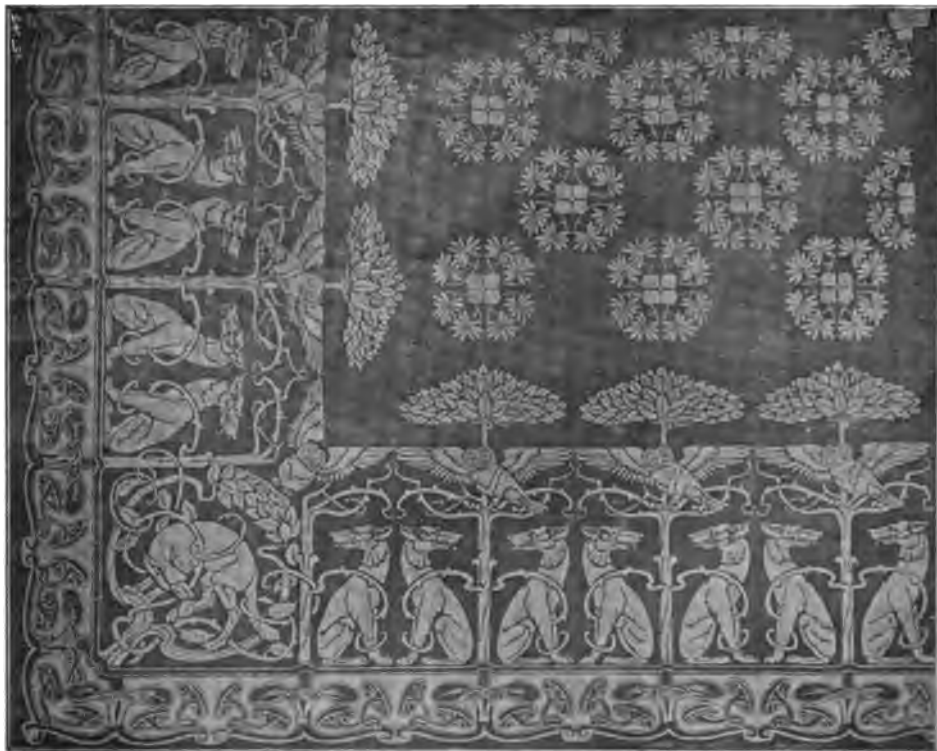
Designs for a Lace Flounce, and Collarettes in Limerick Lace and Crochet.
 Alice Jacob, Dublin School of Art.



James Hodgen

Design for a Counterpane.

Belfast School of Art.



Edwin A. Morrow,

Design for a Damask Tablecloth.

Belfast School of Art.

go to nature for the "motifs" which furnish the body of the design. Care is taken that the individuality of the student shall not be lost, and they are given to understand that if they exhibit good construction, good arrangement, good drawing, and a full evidence of their knowledge of the technical requirements of the material in their designs, they may fearlessly put them upon the market and allow their work to be judged upon its own merits.

The School has always had a good reputation for modelling, and there seems to be something in the Irish mind which takes kindly to this branch of art. Good results have been obtained in this subject also; as, for example, the School gained one gold medal and one silver medal for modelled design in the year 1890, and in 1891 three silver medals and eight book prizes for the same subject. To a small extent the students have supplied a demand for modelled work for the silversmith and the wood carver. However, until a series of technical classes in those subjects with which art is more immediately connected are established in the School, and which will allow the students to embody their ideas in the material, the work of the School cannot be considered to be complete in this direction. On several occasions, chiefly through the instrumentality of the Committee of the Branchardiere Fund, lace teachers have been brought up from different parts of the country in order to obtain instruction in drawing and design, for short periods, in the School of Art. For instance, the lace mistresses at Carrickmacross, Crossmaglen, Armagh, and Benmore, near Enniskillen, have so benefited. In all cases the Reports have been that the instruction imparted to the mistress has proved highly beneficial to the industry. In 1900 a certain number of National school and other teachers were offered a short summer course of lessons in drawing and design. Those who attended were required to do freehand drawing from the cast; foliage from nature, with the brush; geometrical drawing, so far as it applied to design, using those problems which were particularly applicable to the striking out of patterns; and elementary design. The experiment was eminently successful.

The history of the Belfast Government School of Art commences with the establishment, in 1849, of the Government School of Design, one of the centres of art instruction planted in important manufacturing towns about the middle of the nineteenth century. Earlier

**Belfast Government
School of Art.**

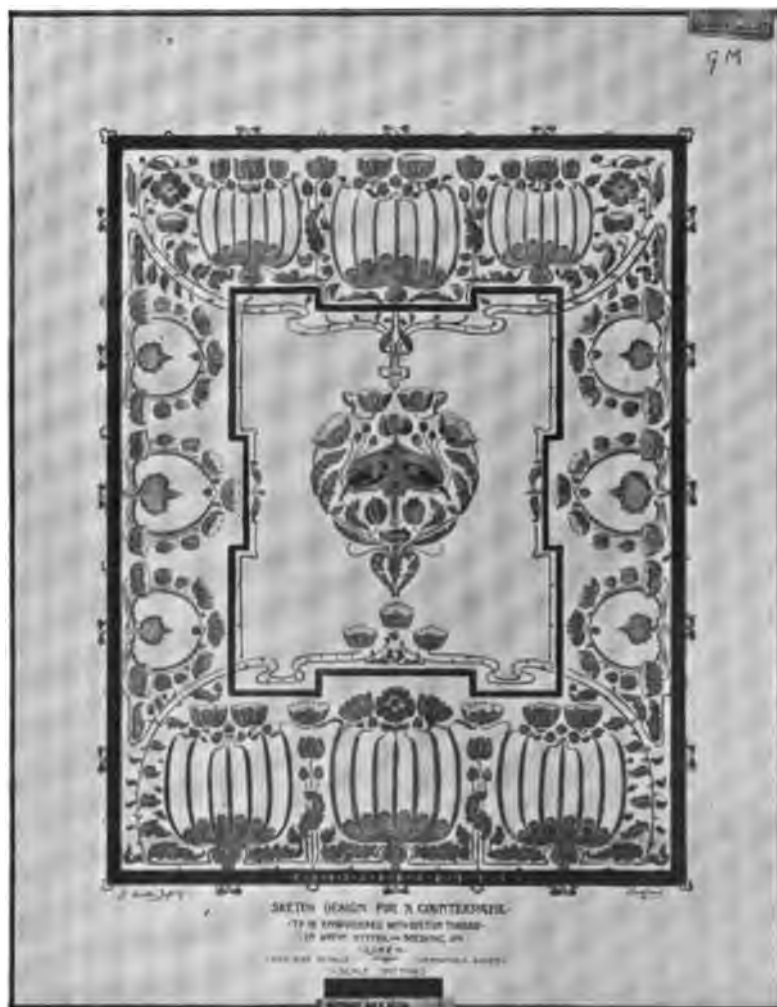
than this, local efforts had been made to draw attention to the desirability of providing means of practical art training for the artisans of Belfast. The first suggestion of a School of Design appears in the "Address to the Public" which prefaces the catalogue of the first exhibition of the "Belfast Association of Artists," in 1836. Among other objects to which it was proposed to devote the proceeds of the exhibitions was the establishment of "a normal school of artistic education, at which lectures on the principles of designing and colouring will be an essential part." The initial effort to get such a school established was not made, however, until 1848, when a correspondence was entered into with the Secretary to the Lord Lieutenant. In reply to official inquiries, it was stated that local subscriptions to the amount of £300 per annum could be reckoned upon, and, as a matter of fact, a sum of more than £400 was subscribed the first year, showing that there was a considerable

amount of interest taken in the project. The Town Council was approached with the view of obtaining a grant from the rates; but it appeared that there was some bar to their making one, although the Cork School of Design was at that time receiving municipal support. The Drapers' Company gave an annual grant of £25, and applications for aid were also made to the Mercers', Grocers', and Fishmongers' Companies, and the Irish Society, though the scanty records available do not show whether they were successful or not. The school also received an annual grant of £500, afterwards increased to £600, from the Government. Altogether, the amount of outside aid received far exceeded that given at any time to the present School of Art.

Lord Dufferin was invited to become president, and the formal inauguration took place early in 1850, the various classes having been in operation, however, from the previous November. Lord Dufferin showed himself a good friend to the School in many ways, offering a prize of £50 in the first year, and founding a scholarship of £20 per annum as well. Another of £10 per annum was given by Mr. Blakiston-Houston, and it was contemplated to provide a third out of the School funds. A Mr. Henning, of Waringstown offered further prizes of £10 and £5, so that there was no lack of encouragement to the students.

Mr. Claude Lorraine Nursey, who had held a similar position in the Leeds School of Design, was appointed headmaster, with Mr. David Wilkie Raimbach (a son of the well-known engraver, Abraham Raimbach) as second in command.

The course of instruction was the same as in other Schools of Design, and comprised drawing from flat copies, and from models and casts; also, studies of plant form, and original design. It is to be feared that these latter studies did not amount to much, for we find the Government Inspector expressing surprise that living plants were not provided for the students, and no design was considered worthy of the large prize offered by Lord Dufferin. Another complaint made by the Inspector was that a proper "sculpture gallery," or antique room, was not provided, and we find frequent reference to this want in the records of the School. As early as October, 1849, the Committee were in treaty with the Governors of the Royal Academical Institution for the erection of a special room, sixty feet by forty, and twenty feet high, for this purpose, and on the 8th of January, 1850, the Secretary wrote to the central authorities that it was expected such a room, only a hundred feet long, would be built at once. But nothing came of the project; and it may be remarked that what was felt to be a pressing necessity for the small number of students of fifty years ago is still unprovided in the present School of Art. From various causes the Schools of Design did not fulfil the hopes of their founders. The manufacturers took very little interest in the undertaking; partly, no doubt, because the instruction given in most of them was not of a very practical character, so far as the main purpose of training designers was concerned. Before a special committee of the Council of the Government School of Design, Somerset House, Mr. Richard Burchett stated that the Central School was "an utter and complete failure"; and Mr. Ambrose Poynter said that the provincial schools had "no pretension to be called Schools of Design."



Sketch Design for a Counterpane.

James H. Jeffrey]

[Belfast School of Art.

The great Exhibition of 1851 only tended to emphasize the lamentable deficiencies of British industrial art in comparison with that of other countries, especially our great dependency, India. The exquisite productions of that country, which many Englishmen had been accustomed to look upon as a semi-barbarous one, were a revelation to all concerned, and put to shame the crude and pretentious work of our own manufacturers and craftsmen. Renewed efforts were made to remedy this unsatisfactory condition of things, and in 1852 a "Department of Practical Art," under the Board of Trade, was established to supervise the work of the Schools of Design, and to advance the cause of industrial art generally. This was superseded in the following year by the Department of Science and Art, as a branch of the Education Department. A wider scheme was organised, and a new system of State aid inaugurated, throwing more responsibility upon the localities for the support of the schools. Direct grants were withdrawn, and the system of payments on results of examinations was instituted.

The effect of this change on the Belfast School of Design was disastrous. Local interest in its work was not sufficient to provide adequately for its support, and so, in 1854, it was compelled to close its doors. During its short life it had not been without influence for good, even if it had missed its proper aim. Many local architects received more or less of their training within its walls, and some of its students eventually entered the ranks of art as professional painters or sculptors. Of these we may mention Samuel M'Cloy, Ebenezer Crawford (a promising artist who died early), Samuel F. Lynn, the well-known sculptor, and Anthony C. Stannus. The building occupied by the Belfast School of Design forms the north wing of the Royal Academical Institution. This Institution, now a public school, was the precursor of the Queen's College, and is still known by many as the "Old College," the square in which it stands being called "College Square" to this day. The School of Design building has been the home of the medical school, and of course the arrangements were not calculated to meet the needs of an art school.

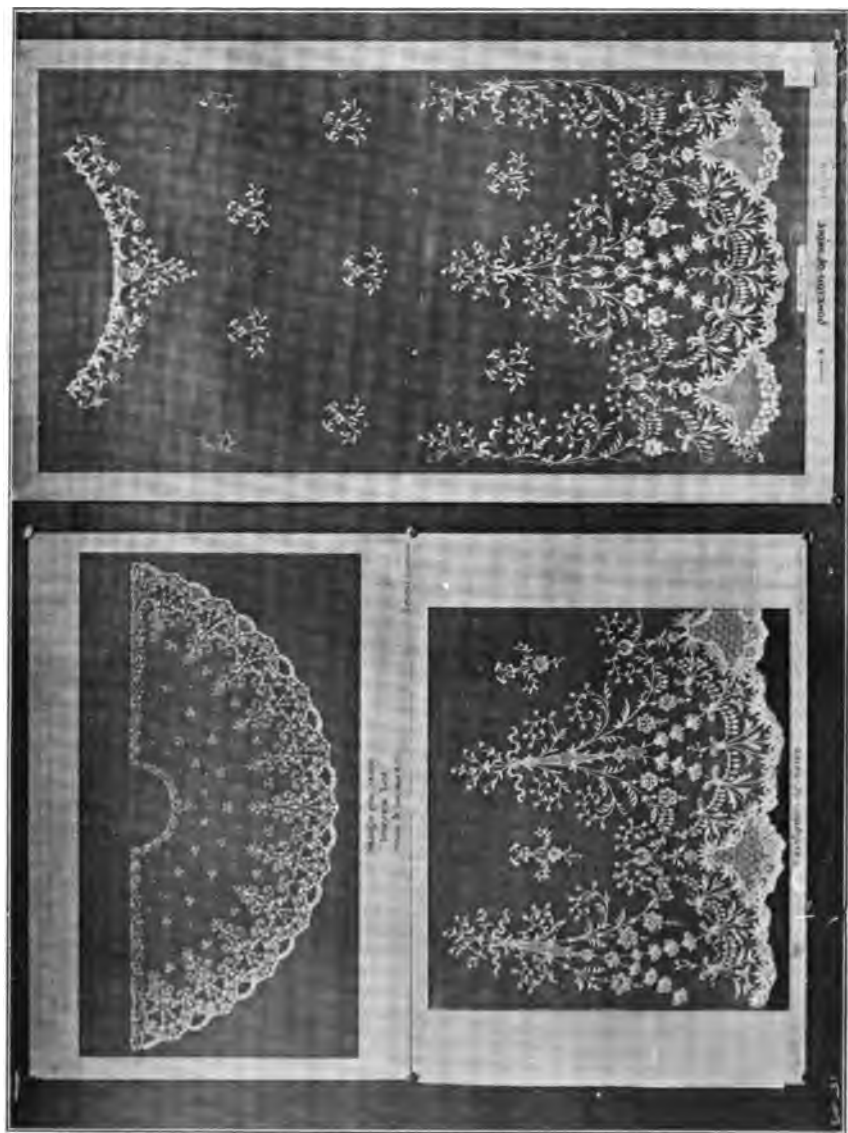
After the collapse of the School of Design drawing classes were carried on in connection with the Academical Institution; but the advantages of a public School of Art were denied to Belfast students until the year 1870, when the same old building was re-opened as the Government School of Art. An influential committee was formed, and a considerable sum of money raised for the equipment of the School, and the establishment of local prizes. Mr. Thomas M. Lindsay was chosen as headmaster, and justified his appointment by the success which attended his efforts. The school took a high place in the national competition, and many of the students laid the foundation of a successful career in art under his direction. In 1880 he was appointed Art Master at Rugby School, and was succeeded by the present headmaster, Mr. George Trobridge, A.R.C.A. (London), who had just completed a highly successful course of training at the National Art Training School, South Kensington. Under his direction the work of the School was somewhat extended—so far, that is to say, as the limited space and unsatisfactory arrangements allowed—especially in the direction of figure drawing. A nude life-class was established, and, for the first time in the history of the School, students were presented for examination in anatomy, and drawing from the antique, in the year 1881. The life-class was

conducted under great disadvantages, and with limited success, one small room having to answer both for life-room and modelling-room, and the students being required to pay the cost of their own models. From this small beginning there have been considerable developments in recent years; and at the last examinations thirty successes were obtained in drawing from antique and from life.

Great difficulties have always been experienced in carrying on the work of the School, owing to lack of space, and the unsuitability of the premises. The Board of Management has done what was possible to minimise these drawbacks; and large sums have been spent in such improvements as could be made in the old building. The expansion of the work of the school has also entailed increased expenditure in various directions, and has led to an embarrassed condition of the finances, which necessarily checks development. With all these obstacles the School has a record of which it need not be ashamed. In the course of the past ten years, during which it has had the advantage of a small yearly grant from the City Council, it has shown remarkable progress. Between the years 1890 and 1898 the successes at the advanced examinations rose more than threefold, and the Government grant was nearly doubled. The year 1900 saw high-water mark in the national competition, sixteen awards being gained, including a gold medal. But perhaps the most remarkable achievement has been in the gaining of scholarships and exhibitions. No less than fifteen national scholarships have been gained since 1872, besides three studentships-in-training, and a local scholarship.* Some of the students who have taken these scholarships now occupy a high place in the art world; some are engaged in teaching, and others are employed as designers in Belfast or elsewhere.

The most important question in regard to any School of Art is whether its operations are of benefit to local industries. A strong affirmative answer may be given in the case of Belfast, though the manufacturers themselves do not always know the extent of their indebtedness to the School. Some years ago, when the Technical Commissioners were taking evidence in Belfast, the head of an important firm was asked, "Do you find the School of Art of any benefit to you?" and answered, without hesitation, "None whatever"; although at the time he had two designers in his employment whom his partner had lately obtained from the School. As a matter of fact, many of the principal designers in the city are students, or former students, of the School, including the head designers in two of the largest damask manufactories. Several firms have produced designs by the headmaster, which have proved most successful, and other members of the staff are occasionally employed in connection with local industries. The teacher of design, Mr. Harry C. Morrowe, is the leading decorator in the city, and has carried out many extensive schemes of decoration. As an indication of the general tendency of the School work it may be mentioned that, of sixteen honours gained in the last national competition, six were for original designs for linen damask, six for embroidered linen, and one for printed muslins. Of the embroidery designs the examiners spoke in very high terms. They said: "The design for white embroidery, accompanied by worked specimens, from Belfast, for one of which, by James H. Jeffrey, a gold medal

* In the year 1899 four Belfast students were holding scholarships in the Royal College of Art.



Designs for a Skirt in Limerick Lace.

Miss Alice Jacob.

Dublin School of Art.



Design for Fan.

Miss M. Nagle.

Municipal School of Art, Cork.



Design for Damask.

Miss M. Nagle,

Municipal School of Art Cork.

is awarded, are admirably adapted for their purpose, and are quite remarkable for their treatment."

The production of practical work in a School of Art greatly depends upon the encouragement given by local manufacturers. In the early days of the Belfast School liberal donations were given for special prizes, and a large number of designs were produced in competition for them. These donations gradually fell away until during several years there were no special prizes at all. In the year 1897, some members of the Board of Management exerted themselves to obtain a better list of local prizes, and as a result of their efforts a large amount of excellent work was produced. The successes in the national competition rose at a bound from four in 1897 to fourteen in 1898, showing how readily the School responds to such a stimulus.

While decorative design, and studies leading thereto, form the most important section of the School work, other studies are not neglected. In the day classes painting from flowers and still-life, and drawing and painting from life, are largely pursued, in addition to more elementary work; and in the summer time classes for sketching from nature are held. There is a Sketching Club in connection with the School, and a Black and White Club to encourage original illustration. Many teachers receive training which enables them to obtain employment and carry the benefits they have received to other centres. A considerable number of school children also attend the classes; and the drawing school at Victoria College, the largest ladies' school in the North of Ireland, is conducted by the head and assistant masters as a branch of the School of Art.

The Belfast School of Art has now been carried on by a local Committee for a period of thirty years. Before another year has expired it will probably be taken over and managed by the City Council. When the new Technical Institute, the plans of which have been drawn up, is built, the School of Art will be housed within its walls. With the advantages it will then possess of greatly increased space and ample funds, a brilliant future may safely be predicted for it. Developments may be looked for in various directions, especially in modelling, the present facilities for which are greatly restricted, and in technical art subjects, such as embroidery, metal-work, wood-carving, &c. The proximity of the weaving school will enable damask designers to study all the processes of realising their ideas in the material, and will thus bring the work of the Art Department into still closer touch with practical manufacture.

Over a century ago a number of Cork citizens, associated for scientific purposes, founded the Royal Cork Institution, and obtained a Royal Charter. A School of Art and Design was started, partly in connection with the Institution, and a report presented to the Board of Trade in 1850 stated that there were 118 evening students and 72 day students on the register, of whom 38 were admitted free. The

**The Crawford
Municipal School of
Art, Cork.**

Royal Cork Institution fell into pecuniary difficulties and became practically moribund, and the School of Art, which occupied the upper portion of the Institution building, suffered accordingly. The place was in such bad repair that at one time the students were

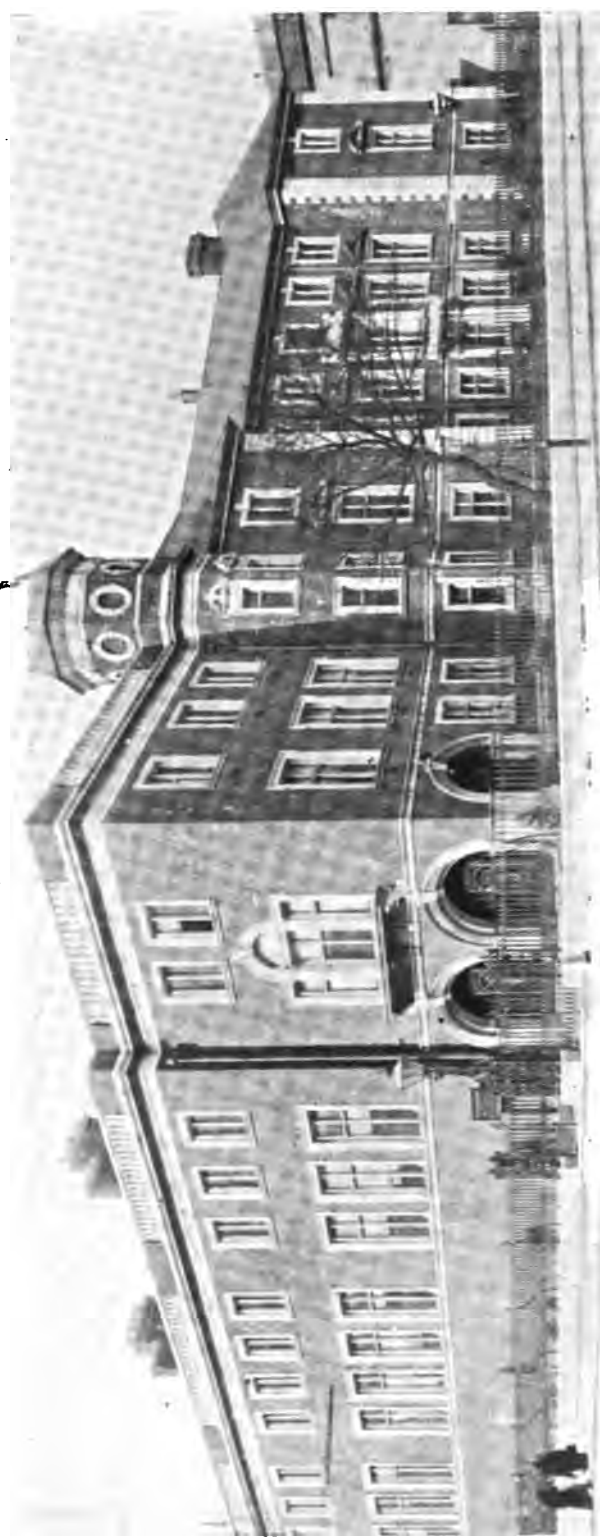
obliged to work under umbrellas. Mr. James Brennan, R.H.A., the headmaster of the School, and Mr. Arthur Hill, R.E., M.R.I.A., and others made repeated efforts to re-organise the Institution and the School, but for some time without success. At length, in 1877, with the assistance of Mr. N. D. Murphy, M.P., a scheme was authorised for the establishment of an improved School of Art, a School of Music, and a School of Science, and considerable support was received from the Corporation.

The handsome building in which the Schools of Science and Art are now housed consists of the old building of the Royal Cork Institution, with a very considerable addition, and the architect, Mr. Arthur Hill, solved a difficult problem with distinct success in the way in which he grouped together the new and the old building into one harmonious and homogeneous whole, so that a stranger could not detect the addition that was made. The new building was presented to the city by the late Mr. W. H. Crawford, with princely generosity, at a cost of over £20,000. Their Royal Highnesses the then Prince and Princess of Wales were present at the opening ceremony in 1885, and christened the building the Crawford Municipal School of Art.

The average number of students attending the School of Art for Art subjects is about 220, and those studying machine or building construction, without taking any Art subjects, bring the total under instruction to about 250. Formerly, the day and evening classes were about equal in number. Thus, in the year 1885-6, the sessions immediately following the opening of the new building, 133 students attended the day classes, and 136 the evening classes; latterly, not more than 70 have attended during the day, and the evening classes average 180. A large proportion of the evening students are either attending or have been educated at the National schools in the city, and, unfortunately, much of the work done at the School of Art is, therefore, of a very elementary character; but it is hoped that with an improvement in the hand and eye training of the National schools it will be found possible to make the instruction in the School of Art of a more advanced character.

The Cork Industrial Exhibition held in 1883 called attention to the lace and crochet industry in the South of Ireland, and the need for improved designs in their production. The visits paid by Mr. Alan S. Cole, of South Kensington, also stimulated both the lace workers and the designers, and from that time the Cork School of Art, and the branch classes founded in connexion with it, have acquired an increasing reputation for the artistic character of the designs for lace and other needlework.

The surplus realized by the Cork Exhibition of 1883 was applied to the founding of two Local Scholarships, tenable at South Kensington by students of the Cork School or the branch classes elsewhere. These Scholarships have proved most beneficial in their results, as will be seen from a few examples. In 1887 Michael Murphy, a stone carver, who had previously held one of the local Exhibitions, obtained a National Scholarship at South Kensington, and has since become a most successful Art craftsman, working chiefly in London, but getting many commissions from architects in other parts of England. In 1896 Michael M'Namara, another stone carver, was successful in obtaining a National Scholarship, having the previous year held a Local Exhibition, and after being a National Scholar for two years, his Scholarship was continued for a third



The Crawford Municipal School of Art, Cork.

year, and he was placed in charge of the other National Scholars. Albina Collins, of the branch class at the Kinsale Convent, was appointed a National Scholar in 1896, and in 1897 Georgina Mackinlay, of the Cork School, and Cecilia Keyes, of the branch class at Kinsale, each secured a National Scholarship, so that in the year 1897 no less than four of the National Scholars at South Kensington were from the School of Art, Cork, and the Kinsale Branch class. All four had previously held Local Exhibitions.

Taking into account the small number of advanced students the Cork School of Art has held a fairly high place in the National Competition of Schools of Art.

In 1896 the first grant from South Kensington under the Technical Instruction Act was made to the School in support of a class for the teaching of Embroidery. In 1899 a further grant was made in aid of the teaching of Limerick Lace making, and in October, 1900, Crochet was added to the subjects of Technical Instruction taught in the School. These Needlework classes have proved of the greatest possible benefit to the designers, whose designs are now much more practical than before, with the result that there is a much greater demand for, and readier sale of, the designs than formerly.

In April, 1900, during the visit of Her late Majesty Queen Victoria to Dublin, specimens of the Needlework executed at the Cork School were submitted to Her Majesty, who was graciously pleased to order two embroidered coverlets, which were completed and forwarded to Buckingham Palace.

Several designs for table damask have been sold in Belfast; and quite recently, in a competition for prizes offered by the Old Bleach Linen Co., Randalstown, Co. Antrim, which was open to the United Kingdom, the second prize of £10 was won by Miss G. Sutton, and the fourth prize by Miss Whitcliffe. The seventh prize for towel design, open to ladies only, was also won by Miss Sutton. Several of the National Competition prizes awarded to this School in recent years have been for modelled works, and now that a special Modelling Master has been appointed it is hoped that modelled designs applied to local industries will be as successful as the designs already produced for Needlework and Damask. There is good terracotta clay in the immediate neighbourhood, so that there seems no reason why it should not be largely availed of by architects for decorative purposes.

SCIENCE TEACHING AND TECHNICAL INSTRUCTION.

The facilities for and the supply of Science Teaching and Technical Instruction in Ireland have been, at any rate until recently, so inferior to those existing in England, that a slight historical retrospect is necessary in order to understand the recent changes in this respect in Ireland. The following extract from the Report of the Royal Commission on Technical Instruction, published in 1884, shows the state of affairs in the early eighties:—

"Whilst science and art classes, many of them very successful, are to be found in several of the important towns of Ireland, there are scarcely any science classes at work in Dublin. Various reasons were assigned to us for this state of things, some of them of a kind into which it is not expedient that we should enter. At the same time, there is in Dublin the Royal College of Science, with a staff of competent professors, an admirable technical museum, and laboratories fairly well equipped for practical work. It appears from the evidence that of the small number of students who follow a complete course of instruction in this institution, about one-half are Englishmen, holders of the Royal Exhibitions of the Science and Art Department, scarcely any of whom become teachers of science in Ireland. There are no short summer courses at the College, like those at the Normal School at South Kensington, for the instruction of science teachers. There are, we are aware, some courses of evening lectures; but although the laboratories of the College are the only ones in Dublin available for practical evening instruction, such instruction in science and in mechanical drawing forms no part of the arrangements of the College. It appears that by the rules of the Science and Art Department, the professors of the College cannot earn grants on the results of instruction in science, as would be the case if they were ordinary science teachers. We are of opinion that so long as the effective work of the College in preparing associate students, and more particularly Irish students, is so limited in area as at present, evening classes with practical laboratory work should form part of the regular College courses, and that the remuneration of the professors should depend in part on the success, or at any rate on the regular attendance, of students at such classes.*

"We would also remark that we have received evidence of a very contradictory nature as to the teaching of science in the Irish Intermediate Schools. We believe, however, that it is engaging the attention of the Board of Intermediate Education, and we only deem it necessary to state in reference to this subject, that efficient instruction in science will not be possible in those schools unless they are provided with proper laboratories, which in most, if not in all of them, are at present entirely wanting.

* A short account of this Institution, which is now under the Department of Agriculture and Technical Instruction for Ireland, may not be out of place here. The College of Science in St. Stephen's-green was originally founded by the Government on the lines of the London Museum of Practical Geology in London. Its original scope was, on the recommendation of its first Director, Sir R. Kane, extended, and, under the name of the Museum of Irish Industry and Government School of Science applied to Mining and the Arts, it embraced the whole range of the Industrial Arts, and in 1853 it was placed under the control of the Department of Science and Art. The inter-relations of this Museum and somewhat similar State-aided institutions of the Royal Dublin Society became somewhat complex, so that in 1855 a readjustment was effected. The "Government School of Science applied to Mining and the Arts" was converted into the present Royal College of Science, and the Institution in St. Stephen's-green ceased to be developed as a Museum. The greater part of its collection was amalgamated with a Museum of Natural History belonging to the Royal Dublin Society, which became the nucleus of the present Science and Art Museum in Kildare-street.—*Editor.*

"But the most important part of our task with regard to Ireland, is to consider the possibility of improving the industrial conditions of the poor and remote districts of the West, by means of technical education.

"By the courtesy of Sir Patrick Keenan, K.C.M.G., the Resident Commissioner of National Education in Ireland, your Commissioners have been furnished with what they understood to be a complete set of the books used in the Irish National Schools. They find that these books are well adapted for the literary instruction of the children of various ages in those schools, and that they contain much interesting information on the natural features and resources of Ireland. But, except as to agriculture, they do not afford adequate assistance towards graduated instruction in industrial processes, or in the ruuiments of the sciences on which those processes are founded. As the Irish National Education Commissioners are by their regulations mainly responsible for the selection of the books used in the schools, this defect should receive their early attention.

"There is a general consensus of opinion on the part of persons of all ranks in that country, whatever may be their views on other subjects, that the prosperity of the poorer districts of Ireland may be greatly promoted by technical instruction in handicrafts and in home industries. There is a conviction not less general, and it is one which visits have fully confirmed in our minds, that the children and young people of Ireland of the labouring class possess great manual dexterity and aptitude, which only requires to be developed in order to be useful to themselves and to those amongst whom they live. As evidence of this, we need only refer to the remarkable success of the Christian Brothers, and to that of the ladies of Religious Orders, in training children and young persons for handicrafts, in Industrial Schools and institutions of a like nature. There appears to be no reason why similar instruction to that which is given in these schools should not be given elsewhere, if the necessary funds and teachers are forthcoming. We have shown that instruction of this kind given on the Continent to persons in remote districts, who would otherwise be idle, has added materially to their resources, both directly, and by training them for employment in larger industrial concerns, and we have ascertained that no great expenditure of public money has been required in order to produce these effects.

"Not only is instruction of this kind deemed to be desirable, but we have found that there is a willingness on the part of benevolent persons in Ireland to assist its promotion by subscriptions and in other ways. It is true that by some it has been proposed that the Government should itself initiate, if it did not entirely charge itself with this work. but we were happy to find there were others who would be quite satisfied if its utility received the imprimatur of the Government, and if the State offered rewards for the ascertained results of instruction of this kind. We are of opinion that successful work of this nature, whether it be conducted by individuals or societies, or by religious bodies, deserves the recognition and reward of the Government. We think it no part of our duty to state which are the home industries best adapted to the conditions of different parts of Ireland. Each locality will be able to form its own judgment in regard to this, and due weight should be given by the Government to such local expression of opinion; payment in all cases being dependent upon the results obtained in the schools or classes. We do not think it would be possible for the Government to train teachers for a variety of home industries, but it might contribute to the payment of such teachers appointed by the localities: and it would be expedient to establish a class of itinerant teachers for service in districts where resident instructors cannot be maintained.

"These suggestions apply even in a greater degree to the instruction of girls than of boys.

"We need scarcely point out that, if it be deemed desirable to introduce manual instruction in the use of tools in elementary schools at all, this would apply in an eminent degree to the primary schools of Ireland. It was stated in evidence before us that in some parts of

Ireland, ordinary handicrafts, like those of the mason, have become absolutely extinct. Whether the children remain in their own immediate localities or migrate to other parts of the country, or emigrate to our colonies or to foreign countries, such instruction leading up to their apprenticeship as skilled labourers, instead of their fulfilling, as is now too much the case, the part of mere hewers of wood and drawers of water, would be of the greatest value to them. We are happy to find that the authorities of the National Board of Education in Ireland appreciate the importance of introducing instruction in manual work into their schools. They have already begun to give instruction of this kind to some few of their teachers, with a view to qualify them for imparting it to the children in the schools: but, in order that this instruction may be satisfactory, it is important that the training of the teachers themselves should be systematic and thorough; and, obvious as this might appear to be, we do not hesitate to impress it upon the minds of the authorities of the National Board. Until the teachers are able themselves to give the instruction, it might be given by skilled and intelligent artisans. We have reason to believe that, whenever efficient teachers can be found, the National Board will be prepared to pay for the results of manual teaching in the primary schools. It is scarcely necessary to say that our statement with regard to drawing, in reference to schools generally, applies with equal force to the Irish schools. We may remark that the progress of children in learning home trades will be much more satisfactory if they have been trained at school in the use of the ordinary tools for working in wood and iron, and in drawing."

The following extract from the Report of the Recess Committee, published in 1896, shows that not much improvement had been effected in the intervening twelve years:—

"There is in Dublin a Royal College of Science, whose declared object is 'to supply, as far as practicable, a complete course of instruction in science applicable to the industrial arts, especially those which may be classed broadly under the heads of—(1) mining, (2) agricultural, (3) engineering, (4) manufactures.' This College is under the Science and Art Department, and is maintained entirely by the Treasury. There is a Technical and Science and Art School in Kevinstreet, under the Corporation, managed by a committee and supported by grants from the Corporation, the Science and Art Department, and the City and Guilds of London Institute. At Ringsend there is a Fishery School, endowed by the Earl of Pembroke, which also receives contributions from the Corporation, and the Science and Art Department. There is likewise in Dublin a Metropolitan School of Art under the Science and Art Department. In Belfast a Weaving School, a School of Art, and some working men's classes are partly maintained by the Corporation, and partly by the Science and Art Department and the City and Guilds of London. In Cork there is a School of Art similarly maintained, and at the Christian Brothers' Schools there is a Technical Laboratory, in which some technical instruction is given."

Since the Recess Committee reported some important changes have been effected in the facilities for Science Teaching and Technical Instruction in Ireland. A Vice-Regal Commission was appointed in 1897 to examine into the question of Manual and Practical Instruction in the Primary Schools under the Board of National Education. The Report showed that, whilst it is generally conceded that no technical instruction should be given in primary schools, there was an overwhelming consensus of opinion that the education given was of too "bookish" a nature, and did not sufficiently provide for that training of hand and eye which is now recognised as of the greatest possible value, not only as an equipment for actual work in after life, but also as in itself an essential part of a complete education. In accordance with the recommendations of the Commission, new regulations have

been issued, providing for instruction throughout the six standards in kindergarten methods and manual training, drawing, object lessons and elementary science, and for girls needlework, cookery and laundry work. This instruction, it is obvious, is not intended in any way as technical education. Its object is to train the intelligence and observation, and to produce habits of neatness, dexterity, and carefulness in the National school children, so that when they leave school they will not be—as the Report declares they are at present—“unfit to enter a technical school, even if they had one at their door.” Shortly after this another Commission was appointed in 1898 to inquire into the subject of Intermediate Education in Ireland. One of the recommendations contained in the Report was that a Modern Course should be established, in which science would play an important part, and no doubt these recommendations will have the effect of giving considerable encouragement to science teaching.

The Science and Art Department plays a large part in encouraging science teaching in England by means of grants awarded for attendance at a school which conforms to the regulations contained in the Science and Art Directory. At one time Ireland earned its proportionate share of these grants. The first change occurred when, owing to the stress of educational circumstances in England, and notably the opinion that the primary schools were sufficiently catered for by the Education Department and by the local authorities, the standard was raised and, at the same time, the Department of Science and Art decided to pay in future for first class passes only, and not for second class passes, as had been its practice. As the former distinctions were difficult to obtain, especially in primary schools, the Irish grants decreased, for many of the secondary schools preferred to follow the curriculum of the Intermediate Board (established in 1878). This course was very generally adopted after 1890, when the endowments of that Board were increased by the residue of the Irish share of the beer and spirits duties, which, in England, were mainly devoted to technical education. The Irish secondary schools now found it much more profitable (from the “results fees” point of view) to follow the “Grammar School” curriculum, favoured by the Intermediate Board, in which science subjects were insufficiently recognised. The late Dr. Preston, the Irish Inspector of the Science and Art Department, in his last report (published June, 1899), again drew attention to the serious decrease in the number of schools in connection with the Science and Art Department, and in the number of pupils under instruction, as well as in the total amount of the grants earned in science, which, he declared, is likely to continue under existing conditions until science teaching becomes practically extinct in Irish schools, a point which he considered was being rapidly approached. The following figures are significant in this respect:—

In the year 1879–80 the number of students under instruction in England and Wales was 41,384, and the Science grants earned were £29,899, whilst the corresponding figures in Ireland were 5,232, and £5,079, i.e., Ireland had 11·2 per cent. of the students, and earned 14·5 per cent. of the grants.

In the year 1889–90 the figures were: England and Wales, 91,246 students, and £75,684; Ireland, 9,531 students, and £7,286, i.e., the English students had increased 120·4 per cent., and the Irish 82·2 per cent. The grants earned in England had increased 153·1 per cent., and those in Ireland 43·4 per cent. The Irish students now

formed 9·2 per cent. of the whole, instead of 11·2 per cent., and the Irish grants were 8·8 per cent. of the whole instead of 14·5 per cent., as in 1879-80.

In the year 1897-8 the English and Welsh students amounted to 154,383, and the grants earned to £167,414, while the Irish students numbered 3,787, and the grants were £2,108, *i.e.*, in eight years the number of English and Welsh students increased 66·6 per cent., and their grants 121·2 per cent., whilst the number of Irish students decreased 63·7 per cent., and their grants 71·0 per cent.

Thus, whilst eighteen years ago the Irish students formed 11·2 per cent. of the total number of students, and their grants amounted to 14·5 per cent. of the total grants, the proportions now are only 2·3 per cent. and 1·2 per cent. respectively.

Art teaching, judged from the same standpoint of grants earned, shows a similar decline in the last two decades, and those other forms of technical instructions which do not form part of the ordinary syllabus of the Science and Art Department, appear to have been similarly neglected. A return dated 19th October, 1899, shows that the total amount of the residue under the Local Taxation (Customs and Excise Act) received by the County Councils in England for the year 1897-8 was £834,826 19s., of which £759,400 15s. 4d. was appropriated to Technical Instruction, in addition to £64,029 8s. 10d. contributed out of the local rate levied under the Technical Instruction Acts, 1889 and 1891. In Ireland, however, where the residue of what is commonly known as the Beer and Spirit duties was not handed over to the local authorities to be applied as in England, but was given to the Commissioners of National Education and the Board of Intermediate Education as part of their endowments, the expenditure on Technical Instruction amounted during the same year to only a little over £7,000. Of this sum £4,577 6s. 3d. was contributed out of the local rate levied in some dozen districts under the Technical Instruction Acts, which supplemented by a grant in aid from the Science and Art Department, amounted to £2,613 10s. 1d.

This contribution of the Science and Art Department is a survival of the old Parliamentary grant which was made under the provisions of the Technical Instruction Act, 1889, and which was withdrawn as regards England, when the residue of the Beer and Spirit duties became available as mentioned above for the promotion of technical instruction in England. The grant was continued in Ireland by the Department of Science and Art under a minute issued in April, 1892, which provided that a grant-in-aid would be made to schools aided by the local authority, and would be equal in amount to the sum contributed by the local authority for instruction in subjects other than those ordinary Science and Art subjects for which the Department gave its ordinary Science and Art Grants, provided that the Department approved of the subjects taught in each district, and of the accommodation provided, &c. The administration of this grant in aid of Technical Instruction and of the ordinary Science and Art grants, and of the Royal College of Science was transferred to the Department of Agriculture and Technical Instruction for Ireland by the Act of 1899, which also placed at the Department's disposal an annual income of £55,000 to be expended in conjunction with local contributions on the promotion of Technical Instruction.

THE ROYAL DUBLIN SOCIETY.

The Royal Dublin Society owes its origin to some fourteen citizens of Dublin, who met in the rooms of the Philosophical Society of Trinity College on June 25th, 1731, for the purpose of considering how they could best "promote improvements of all kinds." The outcome of their deliberations was the establishment of "The Dublin Society for improving Husbandry, Manufactures, and other Useful Arts and Sciences." The original founders of the Society, if we are to judge by the titles of the papers read before its Science Section in the early days, had a just idea of the importance of developing the scientific side of practical industries. The first paper read was one by Thomas Prior upon "A New Method of Draining Marshy and Boggy Lands." Then there was a paper by the same author on the cultivation and management of hops, and one by Dr. Steevens (the founder of Steevens' Hospital), entitled "A Dissertation on Dyeing, and the several materials made use of in Dyeing, and particularly Woad." Other papers on various scientific subjects occupied the attention of the Society in the first few months of its existence.

The Society, at an early stage in its history, became the medium for the administration of funds for the encouragement of Science, Art, and Industry. These funds were originally provided by the members themselves, but in 1761 the Irish Parliament voted the Society a sum of £2,000. This grant was gradually increased until 1800, when it amounted to £15,500. The Imperial Parliament varied the grant considerably, which in 1832 only amounted to £3,000; but it was subsequently increased to a little over £6,000. Originally, most of the money available was spent on premiums, which were awarded for a variety of subjects. Thus, in the year 1765, a sum of £1,215 was devoted to Agriculture and planting. This included premiums for the reclamation of bog and mountain land, the growth of cereals and root crops, the planting of fruit and forest trees, the fencing and irrigation of land, the improvement of bee-keeping and the growth of dye stuffs.

In 1771 a committee was appointed "to consider in what manner it might be expedient to give encouragement for the establishment of good public breweries in different parts of the kingdom." They reported shortly afterwards that, in their opinion, "the discouragement of the consumption of low-priced spirituous liquors in the country is an object of the utmost consequence to the health and morals of the people, as well as to the police and manufacturers of this kingdom, and of course highly deserving of the attention of the Dublin Society." Also "that the erection of new breweries, for a good kind of malt liquor, in the several provinces of this kingdom would be the most likely means to promote this desirable end." The Report was adopted, and a premium of 4s. per barrel was offered for the first 1,000 barrels brewed in a new brewery and sold at 30s. a barrel. The Society continued its efforts in this direction for some time, till the brewing industry became firmly established in the city.

Various premiums were offered for Manufactures, including the manufacture of broad-cloths, wool combs, stocking frames, felt hats, pearl barley, tanning, knitting, and the production of saltpetre and smalt. One of these premiums, that would not commend itself to modern ideas, was for the person who should employ the greatest number of children not exceeding 13 years of age. The premiums for the encouragement of fisheries amounted to £150, and were offered for the promotion of new fisheries, and for the largest takes of fish. A sum of £100 was also offered for the discovery of black lead mines, beds of fireclay, and for the production of fuller's earth, whilst a premium of £50 was offered to the author who should produce the best Natural History of any county, and £22 15s. to the author of the best "Farmers' Monthly Kalendar."

Meanwhile the Society had acquired a local habitation. The first meetings were held in the rooms of the Philosophical Society in Trinity College, and then, for a time, it met in one of the Committee rooms of the Parliament House. On account of its development the Society acquired premises of its own in 1756, in Shaw's-court (now the site of the Commercial Buildings). In 1768 the Society moved to more commodious premises, at No. 114, Grafton-street. In their turn these premises were found to afford insufficient accommodation, and the Society erected a large building in Hawkins-street and Poolbeg-street. This house, which subsequently became the old Theatre Royal, was not long occupied, and in 1815 the Society purchased the city residence of the Duke of Leinster, in Kildare-street, and since that date Leinster House has been the Society's headquarters. In 1732 a field at Ballybough Bridge was taken by the Society for "a nursery for raising several sorts of trees, plants, and roots which do not at present grow in this kingdom, but are imported from abroad, and when raised in such nursery may be dispersed, to be propagated in the country." This was the first step in the establishment of the Royal Botanic Gardens. In 1736 four acres of land near St. Martin's-lane, Marlborough-street, were taken, and in 1795 the Society secured the site now occupied by the gardens at Glasnevin.

From the very beginning books were purchased, and some, such as Jethro Tull's *Treatise on Husbandry*, were printed and distributed at the expense of the young Society. Models and specimens began to accumulate, and with the permission of the Lords Justices, they were deposited for public inspection in a vault of the Parliament House. Such was the beginning of the Library and Museum. A catalogue of the Library about the year 1740 which is extant includes eighteen folio volumes, eleven quartos, and seven octavos, published between the dates 1618 and 1736.

Arthur Young, in his *Tour in Ireland*, published in 1780, was already able to extol the Society's work:—"Great honour," he writes, "is due to Ireland for having given birth to the Dublin Society, which has the undisputed merit of being the father of all the similar societies now existing in Europe. . . . For some years it was supported only by the voluntary subscriptions of the members, forming a fund much under £1,000 a year; yet was there such a liberality of sentiment in their conduct, and so pure a love of the public interest apparent in all their transactions, as enabled them, with that small fund, to effect much greater things than they have done in later times, since Parliament has granted them regularly £10,000 a session."

Early in the nineteenth century a number of inspectors were appointed to make statistical surveys of the different counties and twenty-one volumes of these surveys were published by the Society. They are now important works of reference, and interesting records of the industrial state of Ireland nearly a century ago. Out of this work arose the Geological Survey of Ireland. It began with the survey of the County Kilkenny, which was entrusted by the Society to Mr., afterwards Sir, Richard Griffith, the Society's Mining Engineer.

The survey was extended to the rest of Ireland, and Griffith's Geological Map is still a standard work. A difficulty arose in this work through the lack of proper maps of the country. The society commenced a trigonometrical survey, and after considerable progress had been made in the South of Ireland, the Government took over the work. Thus commenced the survey now carried on by the Ordnance Department, which has its head quarters in the Phoenix Park.

The Irish Parliament had already entrusted the Society with the formation and management of Drawing Schools, and of a Museum of Natural History, in connection with which Professorships of Chemistry, Mineralogy, Natural History and Botany, were also established. In 1845 the Government decided to create in Ireland an institution similar to the Museum of Practical Geology in London, and a house in St. Stephen's-green was taken for this purpose. Its original scope was, on the recommendation of its first Director, Sir R. Kane, extended and, under the name of the "Museum of Irish Industry and Government School of Science applied to Mining and the Arts," it embraced the whole range of the Industrial Arts. In 1853 it was placed under the control of the Department of Science and Art. The inter-relations of this Museum and those institutions of the Royal Dublin Society, which were partly maintained out of State money, became rather complicated, and in 1865 a re-adjustment had to be effected. The Institution in St. Stephen's-green ceased to be developed as a Museum, and its "School of Science applied to Mining and the Arts" was converted into the Royal College of Science, and the greater part of its collections were transferred to the Museum of Natural History. The funds required for this Institution, the Botanic Gardens, and the Library were henceforth entirely provided by the State, which also defrayed most of the expenses of the School of Art, whilst the Society was responsible as trustees for the administration. In 1877 it was found necessary to make a fresh arrangement, with the result that the Government took over the control of the Museum, the Metropolitan School of Art, the Library, and the Botanic Gardens, and acquired the Leinster House and the adjoining premises. The Government, besides making certain payments, arranged to give the Society such accommodation in the Leinster House, free of rent and taxes, as might be sufficient for the functions of the Society, on conditions similar to those accorded to the learned Societies accommodated in Burlington House.

The Society nominates a large number of the Council of Trustees of the Botanic Gardens and the Library (now known as the National Library), and so still exercises a considerable influence over these institutions, whilst the Museum, which, under the title of the Science and Art Museum, was greatly extended and improved by the addition of the fine collection of Irish Antiquities formerly belonging to the Royal Irish Academy, was placed under the care of a Director, appointed by the Science and Art Department. After much discussion as to the advisability of building on the Leinster Lawn, two

wings were added to Leinster House. The wing, extending from Kildare-street nearly up to the National Gallery, was devoted to the National Library and the Metropolitan School of Art, whilst the south wing and the annexes since added (extending from Kildare-street up to the rear of Upper Merrion-street) were devoted to the Museum. In pursuance of the Agriculture and Technical Instruction (Ireland) Act, 1899, the powers and duties of the Department of Science and Art, with regard to these institutions and the Royal College of Science, have been transferred to the Department of Agriculture and Technical Instruction for Ireland.

The separation effected in 1877 between the Society and the Science and Art Institutions inaugurated a new era in the history of the Society. The increased freedom and independence of the Society enabled it to strike out new lines of action, and to devote itself more particularly to agricultural and scientific pursuits, notably to its famous Horse Show. Despite, or perhaps in consequence of, the large sums of money which have been expended upon the Show buildings, the Society is in a most flourishing financial condition, with a large capital fund, and a yearly income of about £25,000. This money is spent in the promotion of Science and its applications, Agriculture, Art and Industries. These departments are under the control of three distinct sections of the Council; the three sections, meeting jointly, along with the honorary officers, constitute the governing body of the Society, a parliament in which the control and management of the affairs of the corporation is completely vested. Each section of the Council is the nucleus of a Committee which is intrusted with the detail work of the department to which it belongs. The Council and the additional members to form the Committees are elected annually by the Society.

Of all the Society's undertakings the annual Horse Show is, without doubt, the best known and the most successful. In the fifth volume of the late Sir John Gilbert's edition of the Dublin Calendar an interesting letter of Sir William Temple's is quoted urging on the Earl of Essex, the Lord Lieutenant of the day, the advisability of holding both a "horse fair and races" every year for the space of a week in the "fairest green near the city of Dublin. At each race may be two plates given by the King, one of thirty pounds, and the other of twenty (besides the fashion), as the prizes for the first and second horse . . . Besides these plates the wagers may be as the persons please among themselves; but the horses must be evidenced by good testimonies to have been bred in Ireland.

"For honour the Lord Lieutenant may ever be present himself, or, at least, name a deputy in his room, and two Judges of the field, who shall decide all controversies, and, with sound of the trumpet, declare the two victors. The masters of these two horses may be admitted to ride from the field to the Castle with the Lord Lieutenant or his deputy, and to dine with him that day, and there receive all the honour of the table. This to be done what quality soever the persons are of; for the lower that is, the more will be the honour, and, perhaps, the more the sport; and the encouragement of breeding will, by that means, extend to all sorts of men.

"For the fairs the Lord Lieutenant may likewise be present every day in the height of them, by himself or deputy; and may with the advice of the two chief officers in the Army then present chuse out one of the best horses and two of the best geldings that appear in the fair, not under four, and not above seven years old, for which

shall be paid to the owners of them, after sufficient testimony of their being bred in Ireland, one hundred pounds for the horse, and fifty pounds apiece for the geldings.

"The benefit of such an institution as this will be very great and various: for, besides the encouragement to breed the best horses, from the honour and gain already mentioned, there will be a sort of public entertainment for one whole week, during which the Lord Lieutenant, the Lord Mayor of the city, and the great officers, both civil and military, ought to keep open table for all strangers. This will draw a confluence of people from all parts of the country. Many, perhaps, from the nearer parts of England may come, not only as to a public kind of solemnity, but as to a great mart of the best horses. This will enrich the city by the expense of such a concourse, and the country by the sale of many horses into England, and, in time, into foreign parts."

These acute anticipations of more than two centuries ago have been more than realized to-day. Not only from the "nearer parts of England," but from nearly every country in Europe, and from America visitors come to enjoy the matchless display offered every August by the Horse Show of the Royal Dublin Society. The first Show was held by the Society in July, 1863, when 368 horses were entered, and prizes were awarded to the value of £470. The Show was held each year, up to 1880, at the Society's Agricultural Buildings, in Kildare-street, on the site of the present Museum. In consequence of the changes made in 1877, the present splendid premises at Ball's Bridge was acquired, upon which a sum of nearly £70,000 has been expended. How the Show has since prospered is best shown by the following figures, which speak for themselves:—

	Entries.	Attendances.
1868, First Show, Kildare-street, .	368	—
1880, Last Show, Kildare-street, .	600	—
1881, First Show, Ball's Bridge, .	589	17,736
1882,	694	14,973
1883,	733	19,980
1884,	806	26,558
1885,	761	22,481
1886,	837	24,251
1887,	950	26,244
1888,	1051	32,534
1889,	1075	36,711
1890,	1324	43,438
1891,	1325	46,083
1892,	1304	53,457
1893,	1156	49,856
1894,	1081	50,250
1895,	1402	58,636
1896,	1363	58,728
1897,	1431	66,167
1898,	1367	59,252
1899,	1397	59,276
1900,	1358	55,326

The Society also holds a Spring Show of Breeding Cattle, Implements, &c., and a Winter Show for Fat Cattle, Poultry and Farm Produce, and it administers a yearly Government grant of £5,000

for the improvement of the Breed of Horses and Cattle. It has also carried out some useful agricultural inquiries and experiments, especially in connection with the prevention of the potato disease, and with example holdings. The Society gives assistance to a number of Provincial Farming Societies, and employs a Chemical Analyst and a consulting Entomologist and Botanist. Other branches of the Society's work include the holding of Exhibitions of Lace and Wood-carving, at which liberal prizes are offered. A survey of the fishing grounds of the West and South-west coast of Ireland has been conducted under the auspices of the Society, which defrayed half the expenses, the rest being borne by the Government.

The work of the Society in Science is carried on at evening Meetings, at which original communications are read and discussed, The papers are subsequently published in the Scientific Transactions and Proceedings of the Society, and by a system of exchange these publications are distributed amongst about 400 of the leading Scientific Societies in all parts of the world. Systematic courses of Science lectures for young people, and popular courses on subjects of scientific interest are delivered each Session. Art is encouraged by Scholarships and Prizes, and the Recitals of Classical Music, which are given during the Session, are said to have had a marked influence on the development of Music in Dublin. The Members and Lady Associates (numbering about four thousand) have also at their disposal reading rooms and a library containing over 20,000 volumes, which includes, along with works of general interest, the most important collection in Ireland of the publications of Learned Societies.

THE NORTH-EAST AGRICULTURAL ASSOCIATION.

The operations of the late Royal Agricultural Society of Ireland having been found so extensive and costly as to prevent the great body of practical farmers from participating directly in its benefits, and smaller local societies being necessarily too restricted in their funds and operations to effect much permanent advantage, several landed proprietors and others interested in agricultural pursuits, entertained a conviction that an intermediate society might, as a connecting link, become the means of extending the benefits of the Great National Society on the one hand, and stimulating the energies of local societies on the other hand. Acting upon this idea, the following met in Hillsborough, County Down, on the 21st September, 1854:—The Marquis of Downshire, Very Rev. Dean Stannus, Lisburn; John Waring Maxwell, Finnebrogue; A. H. Montgomery, Tyrella; H. Stanley McClintock, Randalstown; S. K. Mulholland, Eglantine; S. D. Crommelin, Carrowdore Castle; Rev. Dr. Montgomery, Dunmurry; Jonathan Richardson, Glenmore; William Charley, Seymour Hill; and Fitzherbert Filgate, Hillsborough.

The Marquis of Downshire, who took the chair, read a great number of letters from the leading landed proprietors of the counties of Down and Antrim, approving of the views above stated, and it was unanimously resolved that steps should be taken towards the formation of a Society, to be entitled "The North-East Agricultural Association of Ireland," embracing the counties of Down, Antrim, Armagh, and Monaghan, and having for its general objects, (1) the improvement of stock and farm produce by holding an annual show for their exhibition; (2) the encouragement of the manufacture of implements suitable to the North-eastern counties of Ireland; and (3) the dissemination of practical and useful knowledge connected with agriculture in its various branches.

In order to carry out the resolution of this preliminary meeting, a general meeting of those favourable to the establishment of such an association was held in the Town Hall, Belfast, on 20th October, 1854, to consider its organisation, and the principles and regulations on which its proceedings should be conducted and based.

At this meeting, presided over by the Marquis of Downshire, there was a very large attendance of those interested. Resolutions embodying the objects named were adopted, and the rules submitted to the meeting as the constitution of the Association having been approved of, office-bearers were elected.

The first Show of the Association was held at Belfast on 23rd and 24th August, 1855, when there were offered for competition in the various classes 204 money premiums, amounting to £216; 93 medals, and 74 certificates. In drafting the prize list, the committee acted upon the principle of having two distinct classes, viz.:—one for the amateur, and another for the working farmer. To the former they allotted of the money premiums £78, and to the latter £138. Instead of giving a few large money premiums, they subdivided the sum allo-

cated into a number of smaller ones, thereby distributing the prizes over a greater number of exhibitors, which they considered the most likely plan to secure an extensive competition. There were 506 entries at this Show, which were classified according to the following summary:—

AMATEUR CLASSES.

Bulls,	23
Cows and Heifers,	84
Horses,	29
Sheep,	68
Swine,	32
	—236

FARMERS' CLASSES.

Bulls,	19
Cows and Heifers,	43
Horses,	42
Sheep,	17
Swine,	13
Poultry,	59
Butter,	36
Flax,	8
Flax-seed,	4
	—241
Implement Stands,	29
Total,	506

With a view to carrying out the third object of the Association, viz., the diffusion of practical and useful knowledge connected with agriculture, the committee entered into a negotiation with the Chemico-Agricultural Society of Ulster, for the purpose of seeing whether they could have a joint journal for the two Societies. After a good deal of consideration and discussion, it was concluded that, although it would be most desirable to have a medium through which to communicate the transactions of the Association to the public, the funds were not sufficiently ample to warrant them at that time embarking in such an undertaking.

By the constitution of the Association, its operations were limited to three objects—the holding of an annual show, the encouragement of the manufacture of agricultural implements, and the dissemination of practical and useful knowledge connected with agriculture. These, while primary objects in the extension of agricultural improvement, did not embrace all that was requisite to carry out the purposes of the Association. The committee, therefore, decided to offer premiums for such objects as might, from time to time, appear best calculated to improve the manufacture of agricultural implements, the breeds of stock, and the general husbandry of the country, and they considered it would be desirable to offer prizes for the best managed farms. To carry this into effect, each county was divided into three districts, as nearly as possible of equal extent; and as the best defined boundaries, the baronial divisions were selected, grouping together those that were contiguous to each other. The competitions in each district were divided into two sections—one for holdings containing above

forty statute acres, and another for holdings containing not more than forty statute acres; to each section there was allocated three premiums. These competitions were carried on from 1857 to 1867, but at no period did they come up to the expectation formed at their institution, the entries having been much more limited than might reasonably have been expected.

In 1857 the committee called attention to the desirability of having a uniformity of weights and measures for the sale of agricultural produce throughout the United Kingdom. A report was submitted, showing the variety of systems in use in a number of the principal centres and towns in England, Ireland, and Scotland. This report was printed and circulated amongst the members of the Society, and sent to the Grand Juries, Corporations, and other municipal bodies in Ireland, several of whom signified their approval of the movement, and steps were taken to bring the subject before Parliament. The principle recommended by the Association was, "That all agricultural produce should be sold by weight alone, irrespective of measure, and that it would be desirable to abolish the system of barrels." In 1861 a Bill for the Regulation of Markets and Fairs was brought before Parliament by the Chief Secretary (Mr. Cardwell), which, however, did not contain any provision for the regulation of weights and measures. The Association appointed a special club-committee to consider the clauses of the Bill, and a report was issued, a copy of which was sent to every Member of Parliament for Ireland, and a request made for their co-operation in obtaining the introduction of clauses into the Bill with regard to weights and measures. No enactment, however, was passed during that Session. In 1862 the Chief Secretary for Ireland (Sir Robert Peel) introduced a Bill for the Regulation of Markets and Fairs, which was subsequently withdrawn, and introduced a Bill for the Regulation of Weights and Measures, the clauses of which were not merely in accordance with the principle contended for, but were in many cases couched in the very language in which the views of the Association were brought under the notice of the Government. This Act having been passed through Parliament, is now the law of the land, and thus the many years' labour of the Association were finally crowned with success.

The dissolution in 1859 of the Royal Flax Improvement Society had left Ulster without any established body to stimulate the growth of this valuable crop, and consequently loud complaints had been made by farmers in various places. A special committee, consisting of Messrs. Jonathan Richardson, Glenmore, Lisburn; William Charley, J.P., Seymour Hill, Dunmurry; and John Borthwick, Prospect, Carrickfergus, were appointed and authorised to take such steps as they might consider desirable for promoting the growth of Irish flax. This committee, feeling that it was advisable to proceed gradually and cautiously in carrying out any extensive measures involving a heavy expenditure, more especially as the funds at their disposal were so very limited, confined themselves to revising and publishing in their amended form the instructions compiled by the late Royal Flax Improvement Society. These instructions met with general approval, inasmuch as applications for supplies were received from the farmers, local societies, flax merchants, and spinners throughout the kingdom, as well as from Russia and other European States and America. In addition to these labours the Association made a large increase at the annual show to the prizes offered for Irish flax and flax-seed, and had the gratification of learning that those efforts met with the

approval of the landed proprietors of Ulster, many of whom, although not residing nor having property within the district of the Association, united themselves with it as members. According to the Agricultural Returns, it appears that the extent of land under flax in 1860 was 128,595 acres, and in 1861, 147,866 acres, showing an increase of 19,271 acres in the latter year. This satisfactory result was mainly owing to the efforts made by this and other kindred associations, aided, no doubt, by the remunerative prices of the fibre during the preceding season. The diffusion of instruction and information on the subject of flax cultivation, especially in the south and west of Ireland, where such instruction had been most required, occupied for many years the attention of the Association, and the committee had the gratification of learning from many growers in those provinces that, by simply following the printed "directions" supplied to them, and without any further aid, they had succeeded in producing good and remunerative crops, for which they had found a ready sale by consigning it to Belfast. In all cases the committee took particular care to caution growers against placing more than a small proportion of their respective holdings under flax, in consequence of the uncertain character of the crop.

A winter show of fat stock, poultry, roots, cereals, flax, flax-seed, butter, and cheese was held by the Association on 5th December, 1860. From the unfavourable character of the previous year, which had proved detrimental to similar exhibitions held elsewhere, the committee did not expect a large exhibition, but even taking this drawback into consideration, the success of the show was not sufficiently marked to warrant its continuance.

In connection with the annual show, held in 1870, the Association inaugurated a trial of mowing machines and double furrow ploughs. There were twenty-five of the former and nineteen of the latter entered. The ground selected was the Ulster Model Farm, Balmoral, Belfast, generously granted for that purpose by the Commissioners of National Education. The nature of the soil was such as to fully test the capacity of the most improved implements. This test of the practical working powers of the several machines afforded great gratification to the farming public, many of whom came from great distances to witness the trial. Trials of mowing machines, hay tedders, and horse rakes were held with marked success on the Model Farm in 1871 and 1873. In the former year, forty-seven machines were entered for competition, and fifty-five in the latter. Although no prizes were offered, many eminent makers from England and Scotland, as well as in Ireland, were represented. The committee, however, had been appealed to to dispense with these exhibitions in consequence of the disadvantage under which manufacturers at a distance laboured in competing with those located in Belfast or the neighbourhood.

In 1871 a most influential deputation, representing the railway, banking, and commercial interests of Belfast, waited upon the Committee, requesting them to invite the Royal Agricultural Society of Ireland to hold their exhibition in conjunction with that of the Association's in Belfast in the following year. The Committee, fully sensible of the benefits likely to result not only to the commerce of Belfast, but also to the agriculture of Ulster, by the holding of such an exhibition, gave the subject their earnest consideration, and unanimously passed a resolution deciding to invite the Royal Society to Belfast, and to give the usual guarantee, provided there was a reason-

able prospect of the necessary funds being raised by the town of Belfast and the province of Ulster generally. Acting upon that resolution, a requisition from the merchants of Belfast, and High Sheriffs and Members of Parliament of adjoining counties and boroughs, was presented to the Mayor of Belfast, who accordingly convened a public meeting in the Town Hall, at which the feeling was unanimous in favour of the united exhibitions. The Committee of this Association accordingly transmitted the invitation, and gave the usual preliminary guarantee to the Council of the Royal Agricultural Society, by whom the invitation was accepted in the most complimentary manner, under the personal presidency of His Royal Highness the Prince of Wales. The show was held in Ormeau Park, Belfast, on the 7th, 8th, and 9th August, 1872. The display in the live stock classes was creditable, but in the whole fell short of what might have been expected. This, however, was accounted for by the fact that Foot and Mouth Disease existed among stock at that period to such an extent that the Government Veterinary Department deemed it incumbent upon them to appoint an officer specially to attend the show.

In 1892 a Parliamentary Commission met, with power to incorporate under the Educational Endowments (Ireland) Act, 1885, such educational and other societies as it might deem qualified. The effect of such incorporation is to relieve the committee and members of those societies of liability beyond the funds available by the societies which they represent.

Steps were taken to obtain for the Committee a similar exemption, and an application was made to the Educational Endowment Commissioners to draft a scheme for the incorporation of the Association. The draft was accordingly prepared, and was finally approved of by an Order in Council, dated 21st May, 1894. Under this Act the Association was to be afterwards styled the "North-East Agricultural Association," and the Committee the "Council."

In 1891 a circular was issued to the members of the Association, as well as to the general public of Belfast and the North of Ireland, with the view of raising a fund sufficient for the acquisition and fitting up of new premises in the neighbourhood of Belfast, which would afford more ample space for the Association's shows, and more particularly for the development of its horse shows, which the markets of the Belfast Corporation, in which the shows were always held, were not adapted for. The Committee were pleased to find that the response to the first issue of that circular elicited subscriptions to an amount which gave them every confidence that in a short time the amount required would be subscribed. It was not, however, until 1894 that a sum sufficient to justify them in proceeding with the undertaking was forthcoming, and in 1895 thirty acres of ground were taken at Balmoral, Belfast, from Mr. A. Hamill, D.L., a Vice-President of the Association. These grounds are in every way suitable for the purpose and most conveniently situated as regards tramway and railway accommodation. A sum of upwards of £28,000 has since been expended in putting them into proper order and erecting permanent buildings and stands.

The annual show was held on the 17th, 18th, and 19th June, 1896, and was a memorable one, on account of its being the first held in the new premises, and also by its being extended to three days. The value of the prizes offered amounted to nearly £1,000, and the number of entries was a very great advance on that of any show previously held by the Association.

It may be interesting here to note the number of entries, and the amounts offered in prizes since the first show was held.

YEAR.	Shorthorns.	Ayrshires.	Miscellaneous Breeds.	Horses.	Sheep.	Swine.	Poultry and Eggs.	Butter.	Honey.	Flax.	Flaxseed.	Implement Stands.	Farms.	Total.	Prizes.
1855.	89	28	52	71	85	45	59	36	-	8	4	29	-	506	£ 216
1856.	94	66	93	112	100	77	123	50	-	5	4	64	5	793	273
1857.	73	63	82	76	89	67	88	46	-	5	4	39	12	644	297
1858.	76	61	82	85	119	52	70	37	-	-	-	52	5	639	289
1859.	107	76	45	91	69	60	97	35	-	3	2	51	-	636	386
1860.	99	67	50	72	59	69	102	34	-	-	-	48	7	607	314
1861.*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1862.	102	61	45	74	54	77	120	16	-	4	2	40	8	608	453
1863.	52	84	112	62	63	56	145	15	-	4	4	50	-	647	373
1864.	64	86	104	40	64	45	226	25	-	11	-	40	-	705	331
1865.	77	76	75	76	67	30	168	29	-	11	-	32	3	644	326
1866.†	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1867.	61	41	79	55	81	18	164	24	-	3	-	36	2	584	310
1868.	69	50	56	67	80	26	121	23	-	9	-	40	-	541	278
1869.	78	37	60	40	76	32	120	19	-	8	-	47	-	517	289
1870.	72	37	89	48	55	34	126	14	-	8	-	66	-	549	281
1871.	67	37	43	58	45	54	158	9	-	16	-	73	-	560	254
1872.‡	-	-	-	-	-	-	-	-	-	-	-	-	-	-	110
1873.	73	26	39	60	34	33	89	30	-	13	-	62	-	459	343
1874.	84	21	54	70	62	39	73	32	-	9	-	60	-	504	390
1875.	90	30	37	75	41	30	107	29	-	14	-	55	-	508	439
1876.	96	25	39	121	38	42	68	26	-	9	-	59	-	523	437
1877.	98	47	35	123	29	42	85	33	-	10	-	66	-	563	450
1878.	117	36	40	98	68	37	89	39	-	8	-	66	-	598	452
1879.	81	32	57	131	63	35	103	37	-	10	-	57	-	606	452
1880.	70	30	43	100	59	35	86	38	-	9	-	56	-	526	402
1881.	79	28	45	79	39	42	116	29	-	5	-	60	-	522	396
1882.	61	30	42	95	58	53	108	34	-	-	-	59	-	540	400
1883.	64	26	54	83	55	33	83	41	-	-	-	58	-	497	394
1884.	91	23	54	78	52	41	117	27	-	-	-	66	-	549	409
1885.	72	21	37	92	57	31	114	29	-	-	-	66	-	519	422
1886.	84	22	41	109	45	23	108	39	-	-	-	58	-	529	421
1887.	72	34	63	106	69	44	101	49	10	-	-	63	-	611	425
1888.	72	24	45	82	76	42	72	20	14	27	-	71	-	545	413
1889.	85	22	86	88	80	28	179	38	7	41	-	66	-	720	462
1890.	95	24	102	178	130	58	152	26	12	53	-	66	-	896	461
1891.	81	26	72	139	108	34	125	45	9	35	-	71	-	745	458
1892.	61	22	69	158	95	21	145	26	18	33	-	80	-	728	457
1893.	55	20	75	210	101	20	248	28	20	55	-	68	-	900	494
1894.	58	20	63	199	94	-	281	38	10	46	-	66	-	875	426
1895.	56	12	69	193	100	32	312	24	-	28	-	82	-	906	466
1896.	63	30	113	486	105	47	405	27	10	27	-	78	-	1,391	978

The Chief Secretary for Ireland (Mr. Gerald Balfour), in the course of his speech introducing the Agriculture and Industries (Ireland) Bill during the last Session of Parliament in 1897, made a gratifying allusion to the work of the Association, and at the same time the First Lord of the Treasury called for an expression of expert agricultural opinion upon the measure then before the House. In obedience

* Show of Royal Agricultural Society of Ireland.

† No Show on account of Rinderpest.

‡ Show held in conjunction with Show of Royal Agricultural Society of Ireland.

to this call, the Council appointed a committee to prepare a memorandum on the Bill for submission to the Government, and appointed a deputation for this purpose to wait upon Mr. Balfour in London. The deputation was headed by the Most Noble the Marquis of Londonderry, K.G., President of the Association.

Owing to the financial clauses of the Bill not being considered satisfactory, the Bill was eventually withdrawn. Nevertheless, the necessity for the establishment of a Board of Agriculture seemed to the Council to be as urgent as ever, and the pledges which the Government had given upon the subject in two Queen's Speeches remained as guarantees that this important legislation was not finally abandoned. The Council, therefore, six months later, on receiving an invitation from the Belfast Chamber of Commerce to co-operate with that body and with the Dublin Chamber for the re-introduction of the Bill with some necessary amendments, appeared by deputation before the Chief Secretary at Dublin Castle, in company with many associations representative of agriculture and commerce throughout the country. This deputation, the largest and most representative ever received at Dublin Castle, met with a cordial reception from Mr. Balfour, who renewed the pledges on behalf of the Irish Government to take up their agricultural programme so soon as the exigencies of Parliamentary time should admit.

In 1899, Mr. Balfour introduced a Bill for Establishing a Department of Agriculture and other Industries and Technical Instruction in Ireland, and for other purposes connected therewith. This Bill having passed through Parliament, the Council, in conjunction with the Belfast Chamber of Commerce, decided to invite Mr. Balfour to come to Belfast in January, 1900, and explain at length the object and provisions of the Act, concerning which, naturally, a good deal of uncertainty prevailed. Mr. Balfour kindly accepted the invitation, and his address was followed with close attention.

In order that the aims of the Association might be more fully accomplished, the Council decided in 1897 to hold two shows during each year—one in spring for draught horses, cattle, swine, poultry, dairy produce, implements, and machinery; the other in summer for light horses and sheep, and it is gratifying to state that this departure has been attended by most encouraging results.

The following tables give the number of entries and amount of prizes offered since the show was split up into two separate groups:—

THE SPRING SHOW.

YEAR.	Thoroughbred, Half-bred, and Hackney Stallions.	Draught Horses.	Pole Ponies.	Cattle.	Milking Test.	Swine.	Goats.	Draught Horses in Gear.	Harness Horses.	Jumping Competitions.	Driving and Trotting Competitions.	Poultry.	Butter and Eggs.	Butter-making Competitions.	Implement Stands.	Total Entries.	Prizes.
1897.	-	33	16	200		41		96	-	67	14	361	200	-	73	1,101	€ 638
1898.	17	30	21	215		52	-	85	51	92	9	354	163	-	78	1,170	701
1899.	15	29	21	292	6	43	19	109	56	135	10	466	176	24	68	1,460	923
1900.	13	29	18	333	9	48	38	78	44	93	48	480	212	18	72	1,533	980

THE HORSE AND SHEEP SHOW.

YEAR.	Thoroughbreds.	Hackneys.	Yearlings and Two-year Olds, other than Thoroughbreds.	Young Horses suitable for Harness.	Hunter Brood Mares and Foals.	Young Horses suitable for Hunters.	Hunters.	Roadsters and Saddle Horses.	Harness Horses.	Trotting Horses.	Jumping Competitions.	Driving Competitions.	Sheep.	Roses.	Total Entries.	Prizes.
1897.	18	32	28	10	23	91	76	96	119	21	101	-	92	-	709	786
1898.	19	23	20	24	12	104	62	94	103	19	111	-	137	-	731	866
1899.	21	27	27	24	18	125	80	88	104	19	100	-	117	-	750	891
1900.	18	18	21	13	9	104	76	106	113	14	103	18	158	90	861	949

The total number of members on 31st December, 1900, was 860, and there were 75 lady associates.

It is nearly half a century since the Association came into active operation. At its formation there was but little expectation that it would assume the dimensions to which it has expanded, and in now taking a survey of the past, the members have every reason to be gratified at the enlarged field of usefulness to which it has extended its labours, and the singular success that has marked its career.

THE IRISH FLAX INDUSTRY AND THE FLAX EXTENSION ASSOCIATION.

No single event in recent years caused greater disturbance in the Irish flax industry than the Civil War in America, which for a time almost completely prevented the cultivation of cotton, and led to the destruction of large quantities already harvested in the Southern States ; the effects of this were felt wherever the raw material of any textile manufacture was produced in sufficient quantity to be recognised as a distinct branch of productive labour, and in Ireland, where for a century and a half the manufacture of linen had been almost a national industry, the scarcity of cotton led to marked fluctuations.

The area under flax, which was 128,595 acres in 1860, rose in 1864 to 301,693 acres, an increase of 134 per cent. As might be expected, this enormous increase had a tendency to check the inflation of prices which had taken place in '62 and '63, owing to the scarcity of cotton alluded to above ; in point of fact, the balance between supply and demand was completely overturned, a state of affairs which must always produce harmful results.

In 1860, Ireland had about 600,000 spindles in active employment, consuming roughly 32,000 tons of flax ; of this, the home supply was 24,000 tons, or about three-fourths, between that year and 1864. However, spindles had increased by 50,000, or say $8\frac{1}{2}$ per cent., whereas the area under flax had gone up to 301,693 acres, with a total production of 64,500 tons, an increase, compared with 1860, of 170 per cent. ; or in another form, the supply in 1860 was about 6.4 stones per spindle, and in 1864 about 15.8 stones ; and assuming for the moment that Irish flax only was used, the consumption could not exceed 34,500 tons, leaving a nominal surplus of 30,000 tons ; but as the quantity of foreign flax which was used at that time, and estimated at about one-fourth of the total consumption, must be taken into account, the surplus would approach 40,000 tons.

Taken by itself, perhaps, the large sowing of 1864 was not out of proportion to the disastrous destruction of cotton and waste in the labour available for cotton-growing, but the possibility of judiciously substituting flax for cotton was lost sight of, or, perhaps, never thought of at all, by the Irish farmer when he hurriedly increased his sowing, expecting as a matter of course to reap a profitable harvest.

Capital, however, cannot be manipulated so quickly ; neither private enterprise nor limited companies could secure funds, organize plans, construct or equip factories speedily enough to save the situation ; it is highly probable that if this could have been done, the outlay would have repaid itself. It may be well to point out here, also, that there was no regular export trade established to assist in removing what must have proved a glut in the market, and the inevitable now occurs, the price of raw material, which had been high in 1862 and 1863 and in the spring of 1864, begins to show symptoms of weakness, and in the end of the season, by which time the big harvest is ensured, prices go down with

U.S. \$.

82.194 14.00

207.071 18.11

a rush, the difference in the rate between the opening months of the year and the end of the season is nearly 20 per cent.

This is, perhaps, one of the most unfortunate events in connection with the Irish flax industry which history will have to record; and looking back dispassionately at all the events which led up to it, and the critical position of trade prospects at that immediate period, it is difficult to see how things could have turned out otherwise. In the early months of 1864, prices were at a fairly encouraging level, and the prospects of a supply of cotton were so gloomy, that it is not surprising the Irish farmer over-estimated the reasonable possibilities of an increased demand for flax. There is this much to be said in their favour, the sowing-time was at hand, and the farmers of one district, knowing little of what was going on in other districts, and having no very clear data to guide them, made a very natural mistake; one course only could have helped to keep up the price of flax, viz., speculative buying and storing up; but this was evidently too risky to find favour with capitalists—a collapse of the war in the “States,” or another crop in Ireland approaching the one in question, would have led to a very great loss.

The flax-grower did not, however, repeat his mistake, for in 1865 the area sown with flax-seed fell off 16 per cent., and the harvest-time being unfavourable, the total production was still further reduced—the result was a supply 23 per cent. smaller than the previous year’s. The effect of this was that prices again took a sharp turn upwards, and remained exceptionally high during 1866 and into the spring of 1867, notwithstanding that the supply was fully equal to the demand.

Enough has been written in relation to the raw material to indicate what preceded and partly led up to the formation of the Flax Extension Association in 1867; but another side of the subject not yet touched upon has still to be dealt with; the business of the spinner and manufacturer is two-sided—his wares have to find a profitable outlet, and the difficulties he has to contend with in this direction are as pressing as the acquisition of raw material, if not more so.

The export of linen manufactures of all kinds from the United Kingdom, which had been steadily increasing from 1861 till 1866, began to flag. The value of these exports in the first year named was £3,852,341; in 1866 it had risen to £9,576,245, an increase of 148 per cent.; during 1867, however, there was a falling-off exceeding two millions sterling. This pressed with telling force on the entire trade, and the idea spread rapidly that something should be done to steady and, if possible, increase the supply of home-grown flax. The following advertisement which appeared in the Belfast papers brought the scheme into public notice:—

“Having been requested to appoint a day of meeting to discuss the desirability of forming an association for the extension of the growth of flax, I hereby invite all who take an interest in the subject to meet me at the Chamber of Commerce on Friday, the 16th inst., at 1 p.m.

“JOHN LYTLE,

“President, Chamber of Commerce.

“1867.”

A most successful meeting was held in accordance with this invitation, and the following resolutions unanimously agreed to :—

1. "That the formation of an association in Belfast for the purpose of improving the quality of flax grown in Ulster, and extending the cultivation of the crop elsewhere, is calculated to be productive of much benefit, not only to the trade in general, but also to the agricultural community."
2. "That, for the promotion of the general aims of this association, it should co-operate as much as possible with landlords, agricultural societies, and all organizations which have taken, or may hereinafter take, practical steps for the extension and improvement of flax culture."
3. "That, as one of the chief obstacles to the growth of flax has hitherto been the difficulty of sale in outlying districts, the association should take such steps as would enable the farmers in those districts to dispose of their crop to the best advantage."
4. "That, in order to facilitate the preparation of the flax for sale, this association should afford such encouragement as might be in its power for the erection of scutching machinery in new districts."
5. "That, while encouraging the saving of home-grown seed (chiefly for feeding purposes), the association should afford all possible assistance to landlords and farmers in procuring a supply of the best description of foreign seed for sowing on the most favourable terms."
6. "That the following gentlemen be requested to act as a committee for the purpose of framing rules and regulations for the association, and for further carrying out the object in view." (It is unnecessary to give the names after such a lapse of time.)
7. "That the committee be authorized to apply for subscriptions for the carrying out of the objects of the association."

These resolutions are sufficiently explicit to foreshadow the operations contemplated by the gentlemen forming the association, but a statement which appeared in the Belfast papers a short time previously was, no doubt, in the hands of those who took part in the meeting ; it contained among other statistics the following figures :—

Relative acreage under flax to total acreage under crops
in 1866 and 1867.

	1866.	1867.
In Ulster under flax, .	13·04 per cent.	12·69 per cent.
In Munster ,, .	0·32 ,,	0·25 ,,
In Leinster ,, .	0·46 ,,	0·51 ,,
In Connaught ,, .	0·93 ,,	1·03 ,,

From these figures it is manifest at a glance that there was ample scope for extension. In Munster alone, with its area of 6,000,000 acres, there was a million and a quarter acres under crops, and only 3,248 acres in flax ; the area under flax could be increased here on a very liberal scale, and interfere with no other interests.

The question which naturally follows is, how to commence and carry

out successfully the proposed extension? The first step decided upon was to approach the "Joint Flax Committee" in Dublin. The sum of £2,000 having been placed at the disposal of the Lord Lieutenant in 1864 by the Government for promoting the cultivation of flax in the South and West, the Royal Dublin Society and the Royal Agricultural Society were consulted, each appointed a Committee, the two were amalgamated, forming a "Joint Flax Committee," authorized to look after the arrangements for giving effect to the wishes of the Government. At the time under review this Committee had benefited by three or four years' experience and co-operation with the Northern association, could not be otherwise than beneficial to both. A deputation from Belfast waited upon the "Joint Flax Committee," and received a favourable hearing, and as a result the operations carried on by the Flax Extension Association were calculated to increase the usefulness of what was being done, and supply the links needed to make flax-growing a complete industry.

The reports of the Joint Flax Committee show that the movement carried on by them did not go beyond sending into certain districts a class of men termed instructors; they were drawn principally from the North of Ireland, where flax cultivation was widely pursued and well understood; they were adapted for the work entrusted to their care, and were described at the time as "able, intelligent, and well-informed."

In the first year (1864) twenty-nine were employed, but only for some three months, and their sphere of action was limited to Munster and Connaught. In the second year (1865) fifty-four were appointed, and remained at their posts for a term of six months. During the third year (1866) forty-two instructors were selected for employment; they arrived at the Poor Law Unions to which they were allotted at the 1st March, and being only engaged for eleven weeks, retired at 15th May, but returned to their districts at the 15th July and carried out another spell of duty, also for eleven weeks.

In the fourth year (1867) twenty-eight were sent out in spring and thirty-nine in the autumn, and it is at this time that the Flax Extension Association comes on the scene, and prepares to supplement the work of the Committee by providing scutch mills, markets, &c., the want of which were much felt from the first.

Before entering into particulars respecting the operations carried on by the Association, it may be inquired what were the results of the four years' labours of the instructors. It must be confessed they were not encouraging. In 1864, when the work was commenced, the area under flax in Munster and Connaught amounted to 16,162 acres; in 1867 it had fallen to 10,569 acres—a decrease of 36·6 per cent.

To turn now to the details of the work which engaged the attention of the Association. In a report prepared by a special committee and presented at a general meeting held in January, 1868, the following passages occur, and give a pretty accurate indication of the scheme recommended to the Association:—

"We now approach the more immediate sphere of the Association. The scutching in Ireland, as a rule, is not at all what it should be; and this Association should satisfy itself with the supply of machinery to new mills. It should endeavour also to effect a reform, where needed, in the old.

"Attempts have been made by your Committee to encourage monthly flax markets in outlying districts; and some of the leading spinners and merchants in Belfast have sent their buyers to

“these markets, and even attended them themselves regardless of inconvenience or expense. But such efforts can only be spasmodic so long as there is no certainty of a supply of well-scuthed flax being met with sufficient to make the attendance on these markets a matter of pure commercial advantage.”

In the direction of supplying machinery during the year 1868, grants, or rather loans, for long periods, free of interest, were made towards this object, as follows :—

	£
For a mill at Tulla, Co. Clare,	50
„ Borrisokane, Co. Tipperary,	100
„ Skibbereen, Co. Cork,	60

Prizes for dressed flax to the amount of £58 were paid away during the year for competition at the following places :—

	£
Londonderry, Co. Londonderry,	10
Strokestown, Co. Roscommon,	10
Waterford, Co. Waterford,	10
Cork, Co. Cork,	10
Skibbereen, Co. Cork,	10
Limerick, Co. Limerick,	8

A series of markets were also arranged in conjunction with the local authorities to be held in Cork, Ballineen, and Limerick, regularly in the four winter months, viz. :—October, November, December, and January. These markets were attended by two or three buyers from the large spinning mills in rotation.

In June it was resolved that a careful inspection of the South and West should be made in the interests of the Association at as early a date as possible. Two experienced persons were shortly appointed—one to travel through Connaught, and the other through Leinster; the Secretary of the Association undertaking a similar duty in Munster. A fund of very useful information was thus acquired for the use and guidance of the Association in the succeeding years.

In July a collection of samples from waters intended for retting purposes was secured, and a comparative analysis carried out in the Queen's College, Belfast, to test their fitness for the purpose in view. They comprised two from King's County, one each from Tipperary, Waterford, and Roscommon, seventeen from Cork, two from Kerry, and two from Clare.

Considerable attention was also paid in the Spring to the matter of having good seed available for the farmer in all likely districts, but the care necessary to carry out in detail the plans sketched in the extracts given above occupied the chief attention of the Secretary and his assistants.

In 1869 work of a similar character was continued. The loans were as follows :—

	£
For a mill at Rosscarbery, Co. Cork,	30
„ Mallow, „	60
„ Kilworth, „	60
„ Skibbereen, „	50
„ Rosscarbery, „	60
„ Killala, Co. Mayo,	78
	κ 2

A much larger sum was devoted to prizes this year—the total amounts to £116 17s. 6d :—

	£	s.	d.
Mountmellick, Queen's County, . . .	13	10	0
Waterford, Co. Waterford, . . .	15	0	0
Cork, Co. Cork, . . .	15	0	0
Limerick, Co. Limerick, . . .	15	0	0
Mohill, Co. Leitrim, . . .	13	2	6
Longford, Co. Longford, . . .	16	0	0
Strokestown, Co. Roscommon, . . .	14	5	0
Skibbereen, Co. Cork, . . .	15	0	0

Prizes were also offered in Dundalk, Co. Louth, and Ballina, Co. Mayo, but they were not taken advantage of.

The markets arranged last year (1868) were very well supported this season, the following firms having sent buyers : —

Whiteabbey Spinning Company, Limited.
 Northern "
 Wolfhill "
 Bessbrook "
 Braidwater "
 Ligoniel "
 Philip Johnston and Son, Limited.
 J. Savage and Company, Limited.
 Dunbar, M'Master, and Company, Limited.

In the Spring the Secretary again made a tour in Connaught and a part of Leinster, and visited the following places :—Strokestown, Roscommon, Ballaghaderin, Ballina, Killala, Crossmolina, Boyle, and Sligo ; and later in the year he also visited Belgium and Holland with the object of studying the careful way in which the details in handling flax are carried out in these countries, and being an experienced and successful grower of flax himself, he was able to grasp the entire subject and apply his knowledge to further the aims of the Association.

1870.—The routine of the work was very much the same as during the preceding year. In the month of May the Secretary made a journey in the South and West ; it was principally with the object of inquiring about scutching accommodation. Among the places visited were New Ross, County Wexford ; Fermoy, Mallow, Cork, Dunmanway, Brookville, Kilkeel (near Bantry), County Cork ; Castlebar and Ballyvary in County Mayo. During the year loans were made—

	£
For Scutch-mill at Dunmanway, Co. Cork, . . .	78
" Castlelyons, " . . .	150
" Kildorrery, " . . .	60
" Mountcharles, Co. Donegal, . . .	100

The amount paid in prizes this year was £171 5s. In addition to the places mentioned last season are the following :—

	£	s.	d.
Dundalk, Co. Louth,	15	0	0
Castlebar, Co. Mayo,	1	15	0
Maryborough, Queen's County,	15	0	0
Ballina, Co. Mayo,	30	0	0

The markets established at Cork, Ballineen, &c., were attended by the usual buyers, and rather more flax was on sale than on previous occasions.

The year 1871 was a more eventful one. There was a falling off in the acreage in flax in Munster, Leinster, and Connaught—from 14,477 acres in 1870, to 9,578 acres—a decrease of 33·7 per cent. The "Joint Flax Committee" attribute this to several causes—the want of scutch-mills and markets, sufficiently numerous and convenient, bad seed, and the low price of flax in the end of the previous season. Whether the general results appeared unsatisfactory to the Government or not is unknown; but, at all events, no further grant was made, and the operations of this Committee ceased with this year.

The Executive of the Flax Extension Association were also somewhat disheartened, but they resolved to continue their efforts for some time longer. The loans for scutch-mills were still large, as the following shows:—

For a mill at	Mountcharles, Co. Donegal,	£100
"	Clonakilty, Co. Cork,	50
"	Rosscarbery, "	30
"	Kildorrery, "	40
"	Killala, Co. Mayo,	84
"	Rosscarbery, Co. Cork,	50
"	Skibbereen, "	30

The prizes this year were given in the districts already enumerated, and amounted to £149.

With respect to the markets, the small supply was beginning to be felt disadvantageously, and a practice referred to in an extract from the Annual Report, as follows, had also a tendency to injure them:—

"It is with regret that allusion must be made to a practice which has recently prevailed, and which, if persevered in, will preclude this Association, through their Secretary, incurring the responsibility of inducing spinners to send buyers. The practice alluded to is selling the choice samples of flax at the scutch-mills, and at the farmers' homes; spinners cannot be expected to send buyers, at a cost of both time and money, and find little but low-class flax in the markets, the bulk of the better quality having been bought up in the interval between each monthly market."

Change of Title.—"Extension" having proved impracticable, and the Association having become extremely useful in various ways for the benefit of the spinning and manufacturing industry generally, the title was changed to "Flax Supply Association," as analogous to the "Cotton Supply Association."

No new departure having taken place in the succeeding years, it is unnecessary to dwell on them at any length. In 1872 the loans were:—

For a mill at	Mallow, Co. Cork,	£100
"	Kilworth, "	20

The grants were larger in 1873, amounting to £470:—

For a mill at	Rosscarbery, Co. Cork,	£40
"	Leap, "	100
"	Castletownroche, "	160
"	Kilworth, "	140
"	" "	30

From this time forward the amounts began to fall off, for in 1874 only three mills were supplemented—

Dunmanway, Co. Cork,	£90
Rosscarbery, „	60
Kilworth, „	20

No loans were made in 1875, and in 1876 there were only two small sums disposed of amounting to £70.

In 1872 the amount allotted for prizes was £93, and in 1873 it had dwindled down to £37. Abuses commenced to creep in, and on the recommendation of the Secretary, prize-giving was discontinued.

In the report of the latter year (1873), the Secretary, after referring to unfavourable seasons, enhanced cost of labour, and increased value of stock, writes as follows:—“ Viewing these facts, flax culture in Ireland is in a somewhat uncertain condition, and resolves itse “ into a question of maintenance, rather than that of extension.”

In the end the Executive Committee recommended that the Association should be kept in working order so as to be ready to embrace any opportunity to foster flax in the South and West, and in the meantime turn attention to the much-needed improvement in the manipulation and scutching of flax in the North, where it is still largely grown.

THE COUNTY OF CORK AGRICULTURAL SOCIETY.

The inauguration of this Society dates from the year 1856. It was chiefly owing to the exertions of the late Messrs. W. R. Meade and Thomas Garde that it was started, and much of its success for several years afterwards was due to the energy and ability of these gentlemen. Mr. Meade, who was a distinguished breeder of short-horns and Leicester sheep, lived near Kinsale, and Mr. Garde, who was an equally distinguished breeder of Leicester sheep, lived near Middleton. From 1856 down to 1890 the Shows were held in the grounds of the Corn Market. In this space there was sufficient room for an ordinary Cattle Show; but when the Society, following the lead of the Metropolitan ones, adopted the idea of holding jumping contests, the enclosure in the Corn Market was found to be too limited. The Society, for the next few years, encamped in the racing ground in the Park; but as it was thought there was a great loss in the erection of temporary structures it was decided to come to terms with the Corporation of Cork and lease a piece of ground at the lower end of the Park for the purpose of converting it into a permanent Show ground. The idea was well received by the Corporation, and a piece of ground containing some twenty acres was leased to the Society at an annual rent of £20. On this ground, which is within a mile of the city, the Society expended, in 1892, £5,300 in buildings, cycle and driving tracks, and enclosures. The funds were raised in shares bearing interest at 5 per cent. The Cork, Blackrock and Passage Railway passes by the Showyard, and a special platform has been erected for the use of visitors and others attending the Show. The only drawback to the Showyard is, that as it is a portion of slob land reclaimed from the tide, in wet weather it becomes sloppy, and as the Society have not been over fortunate in their fixtures it frequently happens that the sloppiness of the ground injuriously affects the attendance. To meet this the Society have entered into arrangements with some companies in Cork to deposit road scrapings and rubbish on the lower-lying parts of the grounds, so that in a few years the grounds will be laid high and dry.

In order to encourage cattle breeding a Spring Show has been tried for the past few years, but it was not well supported, and entailed a financial loss. A special Butter Show was also held in connection with the Irish Dairy Association, a few years since, and it, too, resulted in loss. The same may be said of experiments tried in the way of Root, Fruit, and Grain Shows. Dog and Poultry Shows are occasionally held in conjunction with the Horse and Cattle Shows. The indebtedness of the Society at present is about £500. The Shows of the Co. Cork Agricultural Society were open to all comers, and some of the best animals in Ireland stood in its rings. The show of hunters is always a particularly good one. The show of cattle lately, however, has not been up to the mark. We have no breeders in Munster, now, to replace Messrs. Welsted, Campion, Crosbie, Gumbleton, Meade, Smith, or Downing.

Besides the holding of exhibitions, papers on various subjects have from time to time been read by the members of the Society, and resolutions dealing with the principal agricultural topics of the day have been passed and forwarded to the proper quarters. One of the subjects which engaged the attention of the Society for a number of years was the anomalous condition of the Cork Butter Market, under which the seller had no voice. Another question which was warmly taken up at the time was a recommendation to the Government of the day to take steps to establish cordons to prevent the spread of infectious disease among farm animals. But the greatest achievement of the Society was to save the Munster Agricultural and Dairy School from extinction. The Government, at one time, were credited with the intention of discontinuing all the agricultural schools, Cork among the number, but some public-spirited members of the County Agricultural Society came to the rescue, and by liberally subscribing started the first established dairy school in the United Kingdom. The Cork School was the pioneer one. Its success as a dairy school is proved by the number of imitators it has in different parts of Great Britain. The Society has 600 members on its rolls.

Map showing the position of Societies.

Dairy & Agricultural Societies
 Auxiliaries
 Agricultural Societies
 Co-operative Banks
 Poultry Societies
 Miscellaneous
 Federations
 Total No. of Societies
 Total Membership

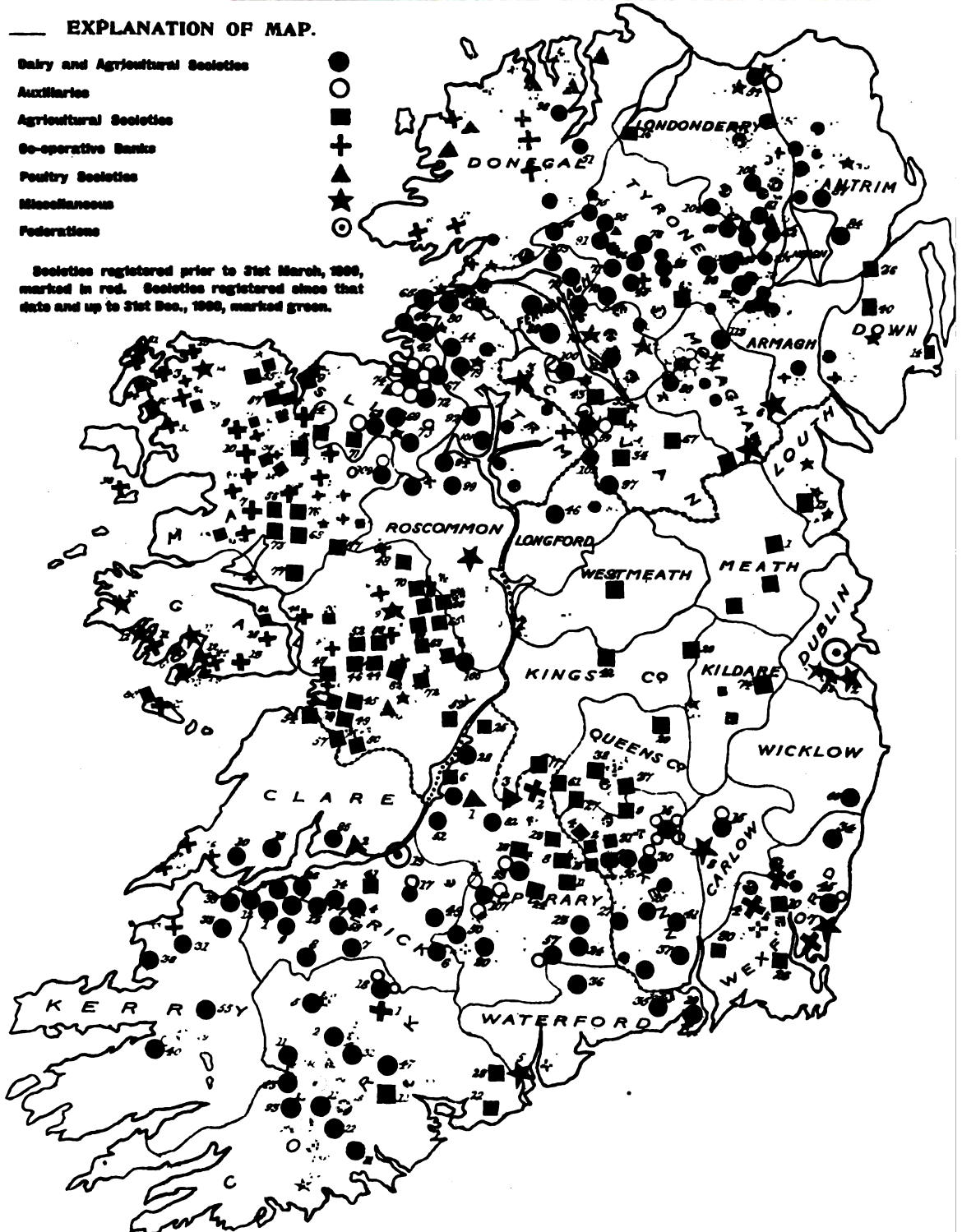
1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900
1	1	17	25	30	33	56	61	83	123	153	185
						5	9	10	13	38	55
						10	31	46	77	99	107
						1	2	3	15	48	75
									3	16	21
									10	18	44
									2	2	2
1	1	17	25	31	34	76	104	148	243	374	498
50	50	850	1,050	1,250	1,650	3,800	10,120	14,290	27,322	38,683	49,000

EXPLANATION OF MAP.

Dairy and Agricultural Societies
 Auxiliaries
 Agricultural Societies
 Co-operative Banks
 Poultry Societies
 Miscellaneous
 Federations



Societies registered prior to 31st March, 1900, marked in red. Societies registered since that date and up to 31st Dec., 1900, marked green.



AGRICULTURAL CO-OPERATION IN IRELAND.

THE WORK OF THE IRISH AGRICULTURAL ORGANISATION SOCIETY.

The Irish Agricultural Organisation Society was founded in April, 1894, to carry on a movement which had been promoted during the five previous years by a few individuals, but which had assumed too large proportions to be carried further without additional support.

The objects of the movement were stated in the Rules of the Society to be "To improve the condition of the agricultural population of Ireland, by teaching the principles and methods of co-operation as applicable to farming and the allied industries; to promote industrial organization for any purposes which may appear to be beneficial; and generally to counsel and advise those engaged in agricultural pursuits."

The originators of this programme held that combination was as necessary to the welfare of agriculture as its general adoption proved it to be to that of all other industries. They saw plainly the economic advantage that could be derived from co-operation in every branch of the farmer's business, and a study of the co-operative movement in England convinced them that the discipline of combination for material advantage would be followed by an all-round improvement in the business habits and methods of the individual. There were, however, immense difficulties to be overcome in inducing Irish farmers even to consider co-operative action. In the first place, voluntary association for industrial purposes was unknown in Ireland, and almost every man who prided himself on special knowledge of the Irish people, confidently declared that it was altogether alien to the national temperament and habits. Moreover, it was pointed out that the leaders of the English movement had utterly failed to apply their principles to the farming industry.

The task before the originators of the movement in Ireland seemed, indeed, almost impossible of accomplishment. However, seeing no other resource in the prevailing depression, and being satisfied that their scheme was economically sound, and that it would appeal as such to the intelligence of the farmers, they determined to enter upon a vigorous propaganda, and persist in it until their programme had been adopted or finally rejected.

The *modus operandi* previously employed and now followed by our Society need not be detailed, but the following extract from the speech of the President, at the inaugural meeting on April 18th, 1894, will at least indicate the reasons why, and the spirit in which, the work of organization is undertaken:—

"The keynote of our proposals is the proposition that the Irish farmers must work out their own salvation, and further, that this can only be done by combination among themselves. I am quite aware of the difficulty which at once suggests itself. It will be pointed out that effective combination for productive or commercial purposes is not to be accomplished simply by a recognition of the fact that it is necessary to combine. An association, which is not to be a mere debating society, but which is to be

capable of joint action, must be organized on certain well-known, but rather complicated lines in order to be permanent. The farmers, from the nature of their occupation, are incapable of evolving for themselves the principles which must be observed in framing such rules as will do justice between man and man, and harmonize the interests of all concerned. Even when a farmer grasps the idea that he ought to combine with his neighbours, he cannot put before them an intelligible and working scheme. Now, here is the point at which, without any interference with his business, without weakening his spirit of independence, without any departure from the principles of political economy, we can do the Irish farmer a great service. To bring to the help of those whose life is passed in the quiet of the field the experience which belongs to wider opportunities of observation, and a larger acquaintance with commercial and industrial affairs—that, gentlemen, is the object and aim of this society."

It is a curious fact that the original promoters of the programme which the Society had taken over, were for some years quite unaware that they had evolved out of a study of conditions at home, the industrial remedy which was already being applied in foreign countries. Of course, when this became known to them, and the knowledge came from the researches of the Vice-President, Father Finlay, they became far more confident of ultimate success, and redoubled their efforts. For it then became simply a question whether the superior natural intelligence of the Irish farmer, in which they confidently believed, could off-set the higher technical and commercial education of his foreign competitor.

At the time of the formation of the Society, the work of organization had been confined, for reasons not necessary to enlarge upon here, to the promotion of Co-operative Creameries—that is, creameries owned and managed by the farmers themselves—thirty having been established by the end of 1893. The original scheme contemplated, as soon as sufficient organising help could be obtained, the extension of the co-operative principle to every branch of the farmer's business. It was, however, necessary to show, before practical men would support a more extended programme, that the success already achieved by the Co-operative Creameries warranted the anticipation of similar success in the other projected developments. A close study of the audited accounts and published statements with regard to these creameries, brought out some remarkable facts and figures. At the end of 1893, the accounts of these 30 creameries, with their 6 branches, showed the following satisfactory results:—

Total number of shareholders	...	...	1,509
Paid-up capital	...	...	£13,845
Loan capital	...	...	7,746
Value of buildings and plant, after allowing for depreciation	...	...	24,872
Milk purchases (7,575,036 gallons)	...	...	123,780
Butter sales (1,273 tons, 6 cwt., 3 qrs., 20 lbs.)	...	...	140,780

The farmers supplying milk to these creameries, variously estimate the increased profit on the return from their cows at 30 per cent. to 35 per cent. This profit, whatever its amount, could only be realized by the farmer through co-operation—a lesson which he was not slow to take to heart.

The societies were not numerous, but they were widely scattered and representative. A distinct step had been taken. It could be generally stated that a highly technical manufacture had been conducted on sound commercial principles by associations of farmers acting through committees elected under their rules from among

themselves. Their product was excellent, and the venture was highly remunerative. There was not the slightest indication of even the average percentage of commercial failure being incurred. This result had been accomplished without any external aid whatsoever, except the advice and exhortation of the apostles of co-operation.

The Co-operative Creameries had proved to the farmers the advantage which accrued to the individual from combination in the production of their butter. The societies were still, though in a less degree, subject to the same disadvantages as the individual, in its distribution. The waste of and damage to their product, incidental to the local butter market was, it is true, obviated by the creamery system, which enabled them to sell their butter in bulk to the commission men. But they had not the means of testing the solvency of these men, or of keeping in touch with the English markets. In fact, the local committees had learned much, but had not commercial experience. Several of the societies, therefore, federated themselves together in a selling society, called the Irish Co-operative Agency Society, which started in the autumn of 1892, with its head office in Limerick, and a store in Manchester. This venture was, perhaps, premature, and too bold. It resulted disastrously at first. The society became involved in lawsuits, contracted bad debts, and, in its first year, lost all its capital. However, the farmers recognised the necessity for independent distribution of their co-operative product, and persevered with their new departure, giving remarkable proof of the thoroughness with which they were imbued with the co-operative spirit.

The accompanying Map* shows graphically the remarkable extension of the work of the Irish Agricultural Organisation Society. In order to give the reader an idea of the scope of that work, the following account (mainly taken from the latest issued Report of the Organisation Society, that for the year ending 31st March, 1899, and consequently, so far at least as the statistics quoted are concerned, not quite up to date) has been compiled:—

The actual number of Dairy Societies in existence [*i.e.* in March 1899] was 191, and their distribution, membership and trade was as follows:—

Province.	Societies.	Membership.	Trade.
Leinster ...	21	1,547	£37,110
Munster ...	64	5,773	247,345
Ulster ...	76	6,903	63,922
Connaught ...	30	6,621	52,937
† TOTALS, ...	191	20,844	£401,314

One hundred Dairy Societies, exclusive of auxiliaries, furnished complete returns of their business. From the statistics it appears that the 20,844 members of these Societies had invested no less a capital than £53,131, which is held by them in fully or part-paid shares. This share capital has been augmented by the sum of £113,427 Loan capital, making altogether £166,558, invested by Irish farmers in the development of this branch of their industry. The value of buildings and plant after depreciation was returned as

* The Statistics on which the Map is based have been brought up to date.

† The total trade £401,314 given here only represents the total trade of those Societies furnishing complete returns.

£97,266, but it was estimated to greatly exceed this figure, as many Dairies were in course of equipment at the date to which the returns refer. Turning to the actual trade done by Dairy Societies, we find that they received nearly twenty-three and a quarter millions of gallons of milk, from which they produced nearly nine and a half million lbs. of butter, or 4,177 tons. The farmers supplying milk realised an average price per gallon of 3½d., with the separated milk and buttermilk given back free. Milk payments absorbed £354,596, and working expenses amounted to £46,081—roughly 11½ per cent. on the value of the output, which realised the large figure of £401,771. A net profit of £6,176 was earned on the year's trading, which is available for allocation among the members of the Societies, whose reserve and accumulated profit now amounts to £13,648. The price received for butter was 9·83d. per lb.—a shade less than the price received in 1897, which was 9·89d. The average yield of butter from the milk is, however, a record, 6·46 ozs. being produced from a gallon. With the exception of 1893 it will be noticed that the yield per gallon has gone up steadily since a record began to be kept in 1892. The actual increase is one-fifth of an oz. per gallon, which, on the 23,205,208 gallons of milk received by the Co-operative Creameries in 1898, would mean 290,065 lbs. value for £11,380.

This sum is clear gain to the farmer, and is the result of improved machinery, greater care in separating and churning, and paying for milk strictly according to its quality. There appears to be no longer any reason to doubt that the greater efficiency of the new creameries will enhance the productiveness of milk by at least 1 oz. per gallon, while, if the farmer pays greater attention to regularly testing the milking qualities of his dairy herd, he will be able to obtain far greater profits than he now can realise without any additional expenditure, merely by weeding out bad milkers and by using suitable fodder. It has been proved conclusively, by experiments at Wisconsin and elsewhere, that by the mere process of selection, together with judicious feeding and careful management, it is possible to increase the productiveness of the milk of a herd of dairy cows by 25 per cent.

A very pleasing feature in the development of the creamery system is the opportunity which it has given to labourers to become cow-owners. Numbers of them now have cows, and one case has been reported where a man, living in an ordinary way-side cottage with one acre of land, has been enabled to own eight milch cows, from the milk of which he has realised £70 in cash during the past year. This man's case is typical of many others. From grazing one cow by the roadside—on the "long farm," as it is called in the country—he was enabled to buy additional cows and rent grazing for them through the profits he derived from the Creamery. The gain per cow over the old butter-making methods is pretty generally estimated at 30s. per annum, but in some cases milk suppliers put it down at a much higher figure.

The Co-operative Creameries are gradually taking up other branches of the farmer's business. There is a considerable increase in the number which now transact "agricultural" business; others have introduced schemes for the improvement of their members' live stock; others again are developing the egg and poultry industry; while some are establishing Agricultural Banks to be worked as an adjunct to their ordinary business. Little advance has been made in the fresh cream trade, the success of which depends almost entirely

upon pasteurisation. The Co-operative Dairies have had in some places to encounter very keen competition, owing to the extension of other creameries worked on the proprietary system. It may be said at once that the Irish dairying industry, and indeed the entire agricultural industry, is suffering from the want of capital; but if the investment of capital from outside deprives the farmer of the power to control his industry it can bring him but little pecuniary benefit, while it places him in the position of a servant rather than that of a partner in the attempt to develop it. In short his industry is merely being developed in the interest of the *entrepreneur* proprietor, who competes with a Co-operative Society, to pay prices for milk which are beyond the power of the Society and which are sufficient to tempt unthinking men to leave their own Creamery for the sake of a small immediate gain, and if this policy is successful it ultimately leads to the failure of the Co-operative Creamery, which must die of inanition, and thus leave to the enterprising and wealthy proprietor undisputed possession of the district. This, from every point of view, must be regarded as a misfortune to the farmers whose apathy or shortsightedness has allowed them to let the control of their industry slip out of their hands. It is undesirable that the investment of, say, £1,000 in the erection and equipment of a Creamery should entitle the investor to control an industry in which the farmers supplying milk have invested, in the form of cows and land, a capital to the extent of £20,000. It has been already argued that our farmers either have, or can command, the required capital; the success of their own Creameries proves that they also possess the necessary business intelligence.

Perhaps the most remarkable feature in the development of Co-operative Dairying is the extension of the "Auxiliary" system which is the best proof that it is working satisfactorily. There is still much difference of opinion as to what is the best working arrangement

The "Auxiliary" System.

between Auxiliaries and Central Dairies. As the organisation of dairy farmers into Societies for the improvement of their industry by mutual help rather than the creation of a centralised system of butter-making on a large scale (which is apt to come under the sole control of the local committee and thus lose, to some extent, its co-operative character) appears to be more properly the function of the Society, the registration of Auxiliaries as independent, self-governing Societies is generally advocated. But two serious difficulties present themselves: (a) That of exercising a certain amount of control by the Central Dairy over the purely technical work of the Auxiliary, without, however, impairing its co-operative character, lessening the sense of responsibility of its members, or unduly interfering with its independence; and (b) That of arranging an equitable basis upon which both Societies may work harmoniously. Now that our Societies are obliged in many instances to compete with dairies owned by individual capitalists or corporations they are forced, to some extent at all events, to imitate the methods of their competitors; they must centralise their manufacture, they must adopt a uniform system of working in their branches or Auxiliaries, and they must strive by every means in their power to make their business as profitable as possible by cutting down working expenses, by increasing their output and by improving its quality. To attain this it is necessary to employ a skilled Manager and Staff at the Central

Dairy and to ensure that the results of this skilled labour shall not be impaired by any slovenliness or neglect at the branches. To do this without causing friction requires not only a good system but also tactful management. What appears to be the best plan is to give the Manager of the Central Dairy, subject to the approval of his committee, (on which the Auxiliaries ought to be invariably represented), supreme authority over the Managers of the Auxiliaries so far as relates to dairying business only. This arrangement we believe to be absolutely necessary and need cause no disagreement between the two bodies or their respective Managers if the duties of the Auxiliary Manager and the powers of the Central Manager are clearly defined in the first instance. But the maintenance of harmonious relations between the Central Dairy and its Auxiliaries, without which the system must break down, mainly depends upon two factors:—(a) the basis upon which the cream is received by the Central Dairy, and (b) the subsequent division of profits between the Societies. The ideal plan seems to be for the Central Dairy to purchase the cream from the Auxiliary at the same price per lb. for butter fat contained as that which it pays to its own milk suppliers, allowing, of course, for cost of separation and cartage to the Central Dairy. The Auxiliary is thus put on a par with the ordinary milk supplier, for it receives payment for the butter fat contained in its cream regularly once a month, and participates in the profits of the Central Dairy at the end of the year. There are two difficulties, however, which have to be overcome. One is, to ascertain the just proportion of expenses to be allowed by the Central Dairy to the Auxiliary for separation (which, of course, must include depreciation, interest on capital, etc.), and for carting the cream; the other is, to determine accurately the percentage and weight of butter fats contained in the cream. Testing cream is immeasurably more troublesome and less accurate than testing milk, but if both Societies are really determined to work together for their common good it ought to prove easy enough to check the cream tests by the simple process of churning the cream and weighing the butter produced. The cream should also be tested before being sent from the Auxiliary to the Central Dairy. There is another drawback to the Auxiliary system which pasteurisation at the Auxiliary itself will remedy: this is the injury to cream in transit by partial churning where it has not been at first pasteurised, or at all events properly cooled. If the Auxiliary system is to be perfected each Creamery must be fitted up with pasteurising machinery, and, though the first cost will be heavy, it will unquestionably be repaid by the improved quality. Pasteurising involves the use of an artificial "starter" to set the true lactic ferment at work in the cream, by which means only butter of an uniformly excellent flavour and quality can be produced. Without this precaution it would be quite possible for the Central Dairy to inflict a very great injustice upon its Auxiliaries, for there would be nothing to prevent it from churning the cream before it was properly ripened, or at too high a temperature, and this would, of course, result in a diminution in the produce. In order that the arrangement between the Central Dairy and its Auxiliaries should be as perfect as possible, the representatives of the latter should be permitted to take samples of the buttermilk after churning, for the purpose of analysis, and, if necessary, to supervise the process of churning itself. There appears to be little doubt but that the Auxiliary system will become practically universal in the future.

The principle of centralisation is economically sound, and all that is required is to evolve a scheme of working which will prove as satisfactory to the Auxiliary Creameries and the Central Dairy as the existing Independent Creamery system is found to be to a Creamery and its suppliers.

The number, membership, and trade of the Agricultural Societies as compared with last year is shown in the appended statement:—

	Number.	Membership.	Trade.
On 31st March, 1899 ...	99	11,025	£56,254
On 31st March, 1898 ...	77	7,921	43,104
INCREASE, ...	22	3,104	£13,150

They are distributed among the four provinces thus:—Leinster, 22; Munster, 16; Ulster, 9; and Connaught, 52.

The two developments of their business which call for special notice are the improvement of live stock, and the establishment of "experimental plots."

Hitherto far too little importance has been attached by our Societies to the improvement of live stock, and it has been left almost entirely to individuals to breed and maintain pure-bred herds of cattle and flocks of sheep, a most costly undertaking, and one quite beyond the means of the average farmer. The Royal Dublin Society has rendered a signal service to the country in this direction, but we believe that in future by doing this work in conjunction with the Agricultural Societies its value to Irish farmers will be greatly enhanced. Without any external assistance the Societies have in many cases enabled small farmers to provide themselves at a moderate cost with pure-bred bulls, boars, rams, and even stallions, and this most valuable work is being now undertaken by Societies in the very poorest parts of the country where improvement was needed most. It is quite impossible to estimate the extent to which the live stock of the Irish farmer may be capable of improvement through the judicious introduction of strains suited to the conditions of each district. The improvement of stock is a branch of the farmers' business which can be well and economically effected by co-operation, but, like the Agricultural Banks, the good results will not all at once be noticeable, and cannot be expressed in pounds, shillings, and pence. We presume that the new Department of Agriculture will make the improvement of live stock part of its programme, and it will find no more valuable auxiliary in this work than Societies, whose members know what they want, and whose business training, and methods of self-help will enable them to show far better results from a small but judicious expenditure than could possibly be expected from a much larger outlay upon an unorganised community.

In their initial stages our Agricultural Societies naturally find it somewhat difficult to obtain the accommodation which they require in their business from the existing Banking institutions in the country, but as the true character of these Societies becomes more manifest this difficulty tends to disappear, as it has invariably done in other countries. Societies therefore are forced to obtain such accommodation on the joint and several security of the members of their Committees at current bank rates, to enable them to give their members the credit to which they have been accustomed in the past. Short of a rigid cash basis, this is decidedly the best plan for

an Agricultural Society to adopt in financing its business. The loan is in the form of an over-draft, and interest is, of course, only paid upon what is actually due to the bank for the time being. This arrangement enables a Society to purchase its members' requirements for cash and upon the very best terms, and, actually in some cases, to earn a small percentage of profit on each transaction where the trade cash discount is higher than the interest paid to the bank. Societies do not as yet universally appreciate the value of the commercial standing which a cash system of trading will enable them to acquire. Their members have been accustomed all their lives to take as much credit as they could get without enquiring too closely into the price which they were paying for the accommodation. Capital can now be procured for business purposes at much cheaper rates than ever before, but still the majority of the farmers of Ireland prefer to deal on credit. If the Agricultural Societies, therefore, did nothing more than to put an end to such a wasteful and extravagant system of doing business they would have rendered a signal service to the agricultural industry of the country.

One very important branch of business has been developed by the Agricultural Societies, viz.:—the sale of bacon pigs. Arrangements have been made by which Societies can now send their pigs direct to the curers, receiving payment for them in accordance with quality and weight. The *modus operandi* is to collect a sufficient number of pigs to fill one or more railway trucks, each member's pig or pigs being ear-marked with a tin label bearing a certain number to identify his lot. When the pigs have been killed, cleaned and cloven a return of their weight is prepared and cheques are made out in payment for each lot at the current market prices. The curers report on the returns as to the quality of the pigs when killed and, of course, the price is regulated by the quality; they point out to the Society from which the pigs come the shortcomings of any particular member's lot, and thus pig-feeders obtain what was never before available to them, an expert opinion on the quality of the pigs they supply. This enables them to correct errors in feeding, etc., and it gives to the careful feeder the proper value of his pig. The curer who buys the pigs allows a commission of 1s. per pig to the Society, which, in the case of many Societies, has provided sufficient funds to remunerate their Secretaries. On the whole this system works well, for it has resulted in the members of Societies in remote districts obtaining far better prices for their pigs than they ever before received. There is still, however, a very great difficulty in disposing of heavy pigs which are over the weight required by the curers for bacon purposes; these are mostly sold in Scotland at present, and at, comparatively speaking, low prices. It is hoped that Societies may take up the industry of killing and curing such pigs for the use of their members and thereby displace a very large quantity of the inferior American salt pork, which at present finds its way into the country, and is actually bought at a higher price than that realised by the sale of these heavy pigs.

Payment being made direct by the curers to the pig-feeders in these cases precludes the possibility of including the sale of pigs in the returns of their trade, and it is not possible to arrive at even an approximation of the extent of the business thus done, but it may be assumed that it amounts to several thousands of pounds sterling.

In a few Societies some dissatisfaction exists owing to the fact that the pigs are bought on a dead-weight basis and at a price fixed absolutely by the curers, and it has been suggested that pigs should be bought alive and by live weight. At present the curers do not see their way to agree to this system of doing business, which, however, is that which governs the far larger transactions of such centres of bacon-curing in Chicago, and it is to be hoped that they may see their way to meeting the demand of the pig-feeders, which appears to be perfectly reasonable. If pigs can be bought by weight and the quality judged while alive in the market elsewhere, it ought not to be impossible to adopt a similar custom in Ireland.

The returns of the business done by the Agricultural Societies give but a faint idea of the amount of good which they have accomplished, for their effect has been to reduce prices of agricultural commodities not only to members of Societies but also to those who are not members but who live in districts where the influence of a Society is felt. Farmers, whether members of Societies or not, are now becoming more critical purchasers, and unless they are deeply indebted to the merchant from whom they obtain supplies, are now much more particular as to the quality of the goods which they purchase. As far as possible it has always been the desire of the Society to encourage Home Manufacture in manures, cakes, etc., in order to keep the money in the country, and it must be admitted that the manufacturers are, at last, becoming alive to the importance of the Co-operative trade, and evince a far greater desire to cater for the wants of Societies than hitherto. As the Societies are bound to increase rapidly, it behoves Irish manufacturers to leave nothing undone to render it unnecessary for our Societies to look anywhere outside Ireland for their supplies, and the least that can be expected of them is that they will put the Societies upon trading terms as favourable as those enjoyed by ordinary dealers in their products.

The Co-operative Poultry Societies now number 16, with a membership of 1,682. They are distributed over

Poultry Societies.

seven counties as follows:—Westmeath 1, Clare 1, Cork 2, Tipperary 2, Antrim 1, Donegal 6, and Galway 3. These Societies have been formed for the double purpose of improving the breeds and methods of rearing and fattening poultry, and improving the methods of placing poultry and eggs on the market. With these objects in view, this Society has employed Poultry Experts who impart Technical Instruction to the Societies in the form of lectures and by demonstration. One of these experts—Mr. Viggo Schwartz—has been brought from Denmark especially to teach our Societies the Danish methods of selecting, grading and packing eggs for exportation. Besides these sixteen Societies specially formed for carrying on this business, several Dairy and Agricultural Societies have taken it up. Most of the Poultry Societies have been but a short time at work, and their total trade turnover for 1898 only amounted to £2,643. This comparatively small trade was mainly due to the difficulties which they had to encounter in obtaining due recognition for the excellence of their eggs on the English markets—the past barbarous system of packing and exporting eggs from Ireland having almost forced down Irish eggs to the lowest position on the markets. Another cause which militated against them was the determined opposition of the egg dealers who offered prices far in excess of what

they had been paying before the Societies were started, and, even in some cases, beyond the real value of the eggs.

When it was decided to take up the re-organisation of the egg and poultry industry two years ago a crisis had arisen in the Irish Egg Export Trade. The Liverpool and Glasgow egg merchants had issued a circular to the Irish Egg Shippers informing them that on and after a certain date they would cease to buy Irish eggs unless they were fresh, clean, properly packed in clean dry straw, or "wood-wool" and in non-returnable cases of the pattern used by Continental shippers. Though this resolution was not universally adhered to by the trade, it created a considerable sensation among the Irish Egg Shippers, who, realising at last that their methods of doing business had almost destroyed their trade, held several meetings and passed many resolutions pledging themselves to carry out the necessary reforms so as to comply with the requirements of the English and Scotch buyers. Hitherto the practice all over Ireland among farmers' wives had been to hold their eggs until they had a sufficient quantity to make it worth while taking them to market, particularly when prices were going up. The egg buyers' circulars and resolutions made no impression whatever on them, for no guarantee was given that better prices would be paid for fresh, clean eggs, than had been hitherto paid, and so they continued to send their eggs to market as before, where they were dealt with as before. The injury done to the trade by the perpetuation of this abominable system of "holding up" eggs was enormous. The Irish egg—under proper conditions the best in the world—was sold at the lowest market price, and was difficult to sell even then. Poultry-keepers grumbled at the low prices and threatened to give up the egg business, and the egg buyers seemed equally dissatisfied. Both had contributed to ruin a profitable industry; neither appeared capable of restoring it to a proper basis.

It was at this juncture that the Poultry Societies began to be formed with the object of bringing co-operation among the poultry keepers and better methods of trading to bear on the business. They at once started on completely new and improved lines which practically amounted to a revolution—they bought the eggs from their members *by weight* instead of by the dozen or score; they refused to take any but perfectly fresh and perfectly clean eggs, and they packed them in accordance with the instructions given by our expert, Mr. Schwartz, on the Continental plan, in non-returnable cases and in wood-wool. But the mischief wrought by the old system made it hard for the Societies to develop their trade.

The Societies' business so far has been mainly confined to the collection and sale of eggs, but some are taking up the table poultry trade—a business which is far more difficult and risky, but which can, without doubt, be developed very considerably. The fowls are bought by weight, killed, plucked, properly trussed, and packed for market, instruction being given by our experts as in the egg business. The sales of poultry have not been as yet very large, but they are steadily increasing, and profits, hitherto unknown, are being realised. The Newmarket Society reports that on one trial consignment alone a profit of one hundred per cent. over the prices that could be obtained locally was realised. This is of course exceptional.

Attention is being directed at present to the establishment of central egg packing depots to be supplied by local federations of

small Poultry Societies, so as to minimise working expenses, and to secure greater efficiency in management. The local Societies will thus act merely as collecting centres where the eggs and poultry are bought and paid for by weight, and then forwarded in patent returnable cases by cart to the packing depot where the eggs and poultry are again weighed and paid for, and are prepared for shipment. At these packing centres poultry fattening will in all probability be carried out in the near future, and a poultry farm will be attached to each, where chickens can be artificially hatched and reared, so as to command the top market prices, and from which the members of the local Societies may obtain sittings of eggs, and stock birds of the breeds most suited to their requirements, at moderate prices. These central depots will also afford those who wish to take up poultry keeping the means of acquiring a thorough knowledge of the industry in all its branches.

When it is remembered that England paid to foreign countries and the colonies in 1898 £4,457,117 for eggs alone, it will be seen that these Societies have a future before them which is only second in importance to that of the Co-operative Creameries.

One of the most encouraging successes which this Report has to record is that of the Irish Co-operative Agency Society. This body, we may recall, was established in 1893 by a number of the Dairy Societies which found it necessary to form a

Trade Federation.

federation for the purpose of jointly selling their produce in the large English markets, and of establishing a distinctive reputation, and, if possible, a national brand, for unadulterated Irish Creamery butter. Repeated difficulties, incidental to a totally novel and extensive class of business undertaken by farmers hitherto inexperienced in large commercial transactions, beset the earlier years of this enterprise. Among these troubles were costly lawsuits resulting from the acts of unsatisfactory officials; the difficulty of financing in Ireland an unprecedented undertaking of the kind; and, worse than all, the apathy, perhaps not surprising at the outset, of the Dairy Societies generally towards the venture. Thanks, however, to the persevering determination, the caution and the natural business capacity of its Committee, seconded by the zeal and ability of its present manager, Mr. Roche, the Agency Society gradually overcame all its difficulties, and to-day it occupies a perfectly sound financial position and its reputation as a trading body stands high in the business world.

Its growth may be best illustrated by the following figures:—

Year.	SALES.				£
1893	45,574
1894	64,857
1895	75,922
1896	110,726
1897	116,238
1898	133,010
1899	[Estimated]		160,000

Total Sales for seven years £706,327

Bad Debts for this period £168
L 2

No better proof could be furnished of the solid business qualities of the Irish farmers who direct this Society than their having incurred so extraordinarily small a proportion of bad debts as £168 in a volume of trade amounting to nearly three-quarters of a million sterling.

The Agricultural Societies now formed a federation for the purpose of transacting the business of joint purchase of their requirements and joint sale of their produce on lines somewhat similar to those on which the Creameries have established the Co-operative Agency Society. This federation, under the name of the Irish Agricultural Wholesale Society, has been at work now for some eighteen months and is steadily proving its utility to the Societies. As in the case of the Agency Society its earlier stage has been attended by some difficulties; but we have every confidence that, like the Agency Society, when it has bought its experience, it will overcome all its difficulties and occupy a position of great importance in the development of the commercial side of the Agricultural industry. Its chief difficulty for some time to come will be finance, and we desire to impress upon local Agricultural Societies the necessity for providing sufficient capital either by shares or loan, or through a system of cash payments by their members, to enable them to deal on a cash basis with the Agricultural Wholesale Society, and thus secure the fullest benefit in price and quality which a cash system of trading alone can render possible.

The trade turnover of the Wholesale Society for 1898 amounted to £29,876. It has secured new and commodious premises at 151 Thomas Street, Dublin, and the business management of the Society is under the charge of Mr. A. O. Watkins, whose reputation in the agricultural trade is well known.

Side by side with its programme of organisation the Society has found it necessary to undertake a good deal of directly educational work, including a considerable system of Technical Instruction, in order that the Societies which it organises may be properly able to fulfil the industrial purposes for which they have been formed.

This fact will have been made sufficiently apparent from various particulars mentioned in the preceding portions of this article, but it is desirable to make a more direct reference to this branch of our work here.

The purposes of these Societies, we may recapitulate, are the manufacture of their butter on the best and most scientific principles in creameries; joint purchase of their Agricultural requirements and the sale of their produce; the improvement of their live-stock, including cattle, horses, sheep, swine, and poultry; the acquisition of machinery, such as steam-threshers, potato sprayers, &c., for the joint use of their members; the improvement of their methods of tillage; the development of early market gardening; the introduction of the Continental system of collecting, grading, and packing eggs for high-class English markets; the establishment of experimental farms under the direction of the Organisation Society's expert instructors; the formation of Co-operative Rural Banks on the Raiffeisen princi-

ple; the promotion of rural industries, such as lace-making, weaving, crochet, embroidery, and needlework generally, for the employment of women in rural districts when not otherwise engaged. To forward these aims the Society employs a number of expert instructors, and carries out a regular system of technical instruction in addition to its work of organising.

Even in the early stages of the movement it was seen that the mere organisation of a certain number of farmers into Societies, the framing of an equitable constitution for these bodies, the drafting of rules which would provide for every contingency which might arise, were but the first and easiest steps. Once a Society is organised, the technical instruction begins with the teaching of business methods and the keeping of accounts, and extends through every phase and detail of the industry for which the Society is formed.



Gweebarra Bridge, Co. Donegal.

Built by the Congested Districts Board.

THE CONGESTED DISTRICTS BOARD FOR IRELAND.

The Congested Districts Board was called into existence in the year 1891 to ameliorate the conditions of life of the inhabitants of certain of the poorest districts of the western coast of Ireland. The 36th Section of the Purchase of Land (Ireland) Act, 1891, declared that where more than 20 per cent. of the population of any county in Ireland live in Electoral Divisions of which the total rateable value, when divided by the number of the population, gives a sum of less than thirty shillings for each individual, such divisions shall form a separate county, known as a Congested Districts County. The districts which have accordingly been declared congested embrace part of each county in Connaught, and part of Cork, Kerry, and Donegal, with an area of over three and a half million acres, and a population of over half a million; the poor law valuation in these districts amounts to about £1 per individual. It will be observed from these figures that the population is congested not as regards the quantity of the land, but rather as regards the quality of the land.

The Board consists of seven permanent and three temporary members, of whom two are *ex-officio* members, one being the Chief Secretary for Ireland for the time being, and in his absence the Under Secretary, and the other a Land Commissioner, who is nominated to especially represent agriculture and forestry.

The annual income of the Board from all sources has hitherto been a little less than £55,000, consisting of £41,250, interest on the "Church Surplus Grant," about £7,000 a year derived from repayments of loans, £1,000 interest from Stock, &c., and £5,600 voted by Parliament in aid of the cost of the staff. From the 1st October, 1899, however, a new Parliamentary Grant of £25,000 has been substituted for the former one, so that the annual income of the Board is now nearly £75,000. The Irish Reproductive Loan Fund, amounting to about £66,000 in securities, cash, and outstanding loans, and about £18,000 belonging to the Sea and Coast fisheries Fund, were also placed at the disposal of the Board.

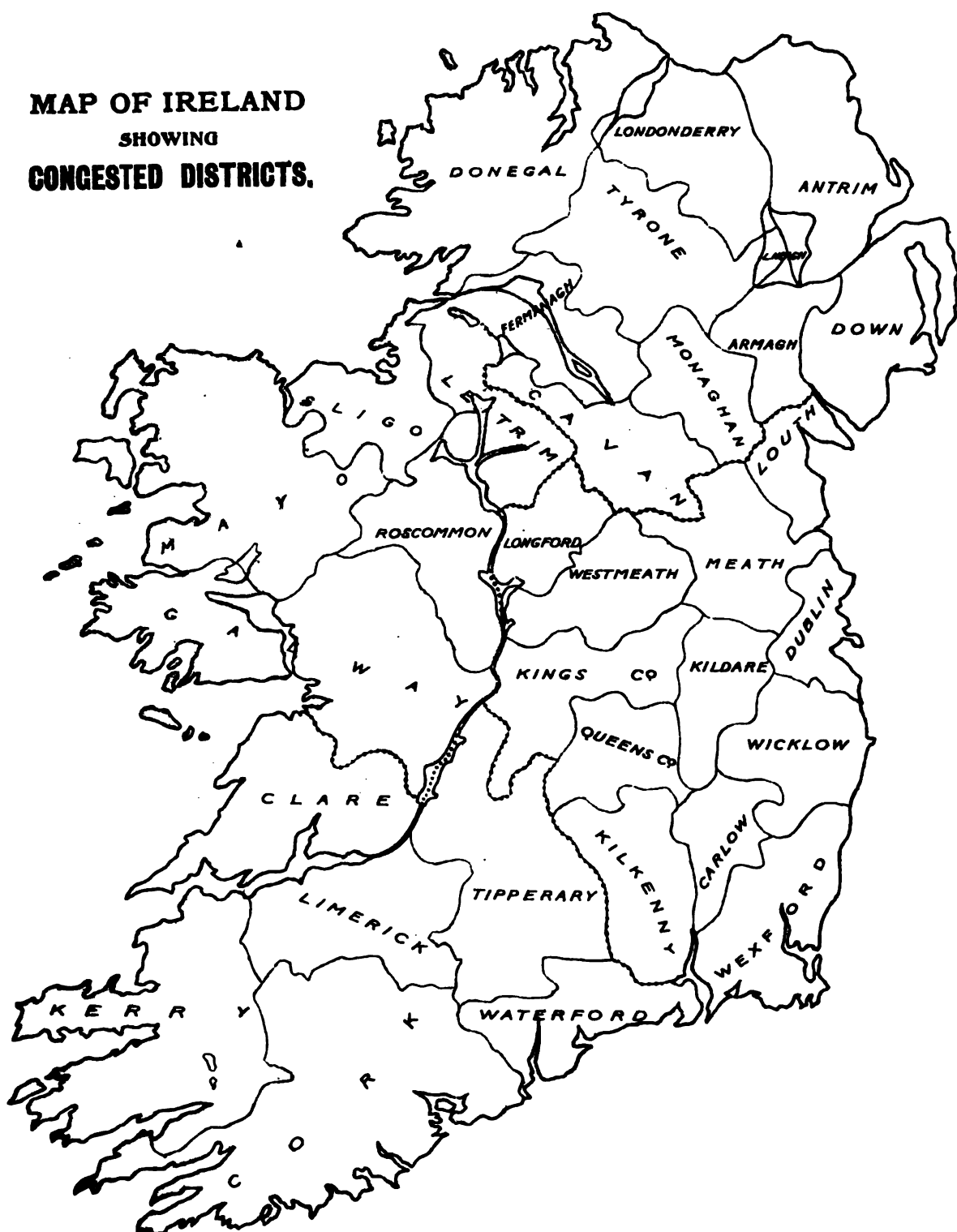
The Board was empowered to direct its efforts first, as regards agriculture, towards increasing the size of small holdings (chiefly by means of amalgamation), improving live stock and methods of cultivation, and aiding migration and emigration; and in the second place towards aiding and developing all suitable industries, including fishing by indirect as well as by direct means.

To understand why the Board worked upon certain lines, and to appreciate the efforts that have been made to bring about a gradual and lasting improvement in these districts, it is necessary to examine what was the actual state of affairs with which the Board found itself confronted ten years ago.

The great majority of the inhabitants were in possession of small plots—they could hardly be called farms—generally about two to four statute acres in extent. The rents for these holdings varied from a few shillings to several pounds a year; but in most cases rights of turbary (*i.e.*, rights of cutting turf for fuel) and rough commonage, grazing rights were appurtenant to the holdings, and frequently the

**The Struggle for
Existence
in the West.**

MAP OF IRELAND
SHOWING
CONGESTED DISTRICTS.



tenants possessed the right of cutting and gathering seaweed for manure or kelp burning. The plots were usually planted with potatoes and oats, and the methods of cultivation were extremely primitive; there was no rotation of crops, no adequate supply of manure, and insufficient drainage, whilst the breeds of live stock were worn out and of little value. The result was that the inhabitants were forced to depend very largely upon certain secondary sources of income of an uncertain and varying nature. Many "congests," as they are locally known, received occasional gifts from relatives in America, whilst weaving, knitting, and sewing formed other small subsidiary sources of income. The results of sea-fishing helped those dwelling along the coast to eke out a scanty living, whilst people living inland depended largely upon the wages earned during some months of the year as migratory agricultural labourers in England or Scotland. Thus in many cases the people did not really live on the produce of their holdings, but rather on some secondary source of income, such as field labour in England or Scotland; they paid a rent for their holding, not generally because of its agricultural value, but rather because it was necessary to have some home for their family. In a "good year" many of the inhabitants were little more than free from the dread of hunger, whilst a bad year, arising from the complete or partial failure of their crops, produced a condition of semi-starvation.

The Board collected and published in its first report considerable information as to the income and expenditure of typical families in the congested districts. Four of these "family-budgets" are reproduced below:—

No. 1.

Receipts and Expenditure of a family in ordinary circumstances, the receipts being derived from *Agriculture, Migratory Labour, and Home Industries.*

RECEIPTS.		EXPENDITURE.	
	£ s. d.		£ s. d.
Sale of cattle,	6 0 0	Flour or baker's bread,	9 2 0
" sheep,	2 10 0	Tea,	6 1 4
" pigs,	3 0 0	Indian meal,	3 18 9
" eggs,	4 0 0	Sugar,	2 3 4
Migratory earnings of men,	10 0 0	Fish and bacon,	2 0 0
Children's earnings as servants,	6 0 0	Salt and soap,	0 10 0
Knitting, sewing, &c.,	7 10 0	Oil and candles,	0 15 0
Miscellaneous sales of kelp, butter, fish, fowl, etc.,	2 0 0	Clothing (exclusive of purchases by migratory labourers while absent from home),	6 0 0
		Rent,	1 10 0
		County Cess,	0 5 0
		Church dues, etc.,	1 0 0
		Tobacco,	3 0 0
		Furniture, etc.,	1 0 0
		For replacing or exchanging cattle,	2 0 0
		Young pig,	1 0 0
		Bran,	1 0 0
		Carts, implements, etc.,	1 0 0
		Artificial manures,	1 0 0
	£41 0 0		£42 15 0

Home produce consumed by the family is valued at from £12 to £20.

No. 2.

Receipts and Expenditure of a family *in ordinary circumstances*, the receipts being derived from *Agriculture, Fishing, and Home Industries*.

RECEIPTS.				EXPENDITURE.			
		£	s. d.			£	s. d.
Sale of heifer or bullock, ...		4	10 0	Rent,		2	0 0
" five sheep,		3	15 0	County cess,		0	5 8
" pig,		3	10 0	Tea,		5	17 0
" eggs,		2	4 4	Sugar,		1	19 0
" flannel or tweed, ...		3	10 0	Meal,		7	14 0
" corn,		0	15 0	Flour,		1	17 6
" fish,		8	0 0	Clothing,		6	8 6
" knitting, etc.,		1	0 0	Tobacco,		2	7 8
				One young pig,		0	15 0
				Implements, etc.,		1	4 9
		£27	4 4			£30	9 1

Home produce consumed by the family is valued at from £5 10s. to £10.

No. 3.

Receipts and Expenditure of a family *in very poor circumstances*, the receipts being derived from *Agriculture and Fishing*.

RECEIPTS.				EXPENDITURE.			
		£	s. d.			£	s. d.
Sale of calf,		2	0 0	Rent,		1	10 0
" two sheep,		0	16 0	County Cess,		0	2 0
" pig (profit),		2	0 0	Clerical charges, etc.,		0	6 0
" fish,		3	0 0	Meal,		2	0 0
" eggs,		2	0 0	Flour,		1	10 0
				Groceries, etc.,		0	10 0
				Clothing,		3	0 0
				Lights,		0	5 0
				Utensils, tools, etc.,		0	10 0
				Tobacco,		1	6 0
		£9	16 0			£10	19 0

Home produce consumed by the family is valued at from £12 to £17.

No 4.

Receipts and Expenditure of a family *in the poorest possible circumstances*, the receipts being derived from *Agriculture and Labour in the locality*.

RECEIPTS.				EXPENDITURE.			
		£	s. d.			£	s. d.
Eggs,		1	3 0	Rent,		1	0 0
Sixty days' labour, at 1s. ...		3	0 0	County Cess,		0	2 0
Herding cattle,		4	0 0	Meal,		5	17 0
				Clothing,		0	10 0
				Groceries,		4	0 0
		£8	3 0			£11	9 0

Home produce consumed by the family is valued at about £6.

The facts and figures collected by the Board speak eloquently for themselves and show that in some congested districts the value of the produce of the farm, together with the earnings and receipts of a family from every other source, did not exceed a total of £15 a year, while in other congested districts the annual resources of an ordinary family were worth nearly as much as £80. But even in the most prosperous of the congested districts the standard of living was low, the diet being altogether vegetable, with the exception of salt fish or bacon at times, which was used more as a *relish* than as an article of food. The houses, furniture, and bedding were too often unhealthy, mean, and comfortless, and the clothing frequently ragged and scanty.

Some of the best work of the Board has been done in connection with the improvement and enlargement of holdings. The Board has, first of all, to arrange with the landlord for the purchase of his interest, Guaranteed Land Stock being advanced by the

Enlargement of Holdings.

Land Commission for this purpose. The Board proceeds to re-arrange and enlarge the holdings and then to re-sell them to the tenants. When there is any grazing or unoccupied land available it is generally utilized for enlarging the adjoining holdings; but this simple procedure is seldom possible, and often the Board has to carve out a new farm from the unoccupied land and build a new house for some neighbouring tenant in order to induce him to give up his original farm, which is then utilised for division amongst the adjoining tenants. The difficulties of "re-striping" the estate—i.e., squaring and re-arranging the holdings so as to make them compact and large enough to be of use—are, of course, enormously increased by the way in which what were originally compact farms have been sub-divided.

On many estates in the West, especially where the land is poor and a dense population has been in undisturbed possession for many generations, the people have sub-divided the holdings from time to time in their own way, and the result is that often the holding of one tenant does not consist of one or two or even three separate portions of land, but of many detached fields or plots within fields, lying amongst similar fragments of other scattered holdings. A field of one acre may belong to a dozen persons, each of whom owns his particular plot, and very frequently matters are still further complicated by "undivided shares" in various fractions of plots, such as three-fourths of one and one-sixteenth of another.

In order to ensure that the new holding which is to be offered to the tenant is of at least the same value as the old, it is not only necessary to estimate the quantity and quality of the land in each plot, but due consideration has also to be given to rights that may be possessed of commonage grazing or of cutting turf and seaweed; and, after all these more or less technical difficulties have been surmounted, the Board may find their plans upset and their progress stopped by some one unreasonable person who refuses to accept the new holding or to give up the old one; thus on one estate considerable trouble arose from such action on the part of an old woman who held a strip of land completely surrounding a small village, each inhabitant of which had houses or land both inside and outside the encircling holding. This action on the part of the tenants is, however, quite exceptional, now that they understand that the measures adopted are for their own good; and, despite other difficulties, the Board has persevered in the work of purchasing, improving, and then re-selling holdings to the tenants, as it wisely considers such a scheme likely to prove the most permanently beneficial

measure it can take in order to better the condition of the small occupiers in the congested districts. This is specially applicable to the inland districts, where agriculture must always be the chief industry, and where a very large number of occupiers, beyond all doubt, have not sufficient land, regard being had to both quantity and quality, to give full employment to their labour or to afford them a bare subsistence. Accordingly, from the beginning the Board has recognised that in many cases any scheme which merely fixed these men as peasant proprietors in their holdings without some collateral proposal to improve the farm or to increase its size would but intensify the troubles of the situation.

Clare Island, which was purchased for £5,000, affords a good example of the Board's procedure. The extent of the

Clare Island. island is nearly 4,000 statute acres, with a Poor Law Valuation of £507 18s., and a rental of £495 16s. 6d., payable by ninety-five tenants. The whole island was held in rundale: no one knew where his land began or ended; he only knew that he had certain grazing rights over certain parts. There were no fences, and the cattle strayed practically unrestrained, even over whatever arable patches there were; the holdings were wretchedly small, and over two years' arrears of rent were due. The first work undertaken was the building, at a cost of £1,600, of a strong stone wall, about five miles long, across the island separating the pasture from the tillage lands. This was necessary, as, owing to the fact that there were no fences, cattle and sheep roamed over the whole island, and when the crop was in the ground the tillage land had to be guarded against the cattle by the members of the tenants' families. Under the supervision of the Board's inspector all this has been changed. Cattle sheds have been built, main drains opened, holdings extended, the striping carried out, and over fifty miles of fences constructed. The wages earned by the islanders engaged on these works have enabled them to pay their rent, including the arrears; but now that these wages have ceased, the rent will have to be raised out of the holding itself. A useful provision of the Land Purchase Acts which prohibits the sub-division of a holding so long as any of the purchase-money remains unpaid, will, it is hoped, check the propensity, so noticeable in the past, of sub-dividing the land.

Up to 1899 the Board had purchased estates to the extent of 25,000 acres, and in that year they enormously extended the range of their operations in this

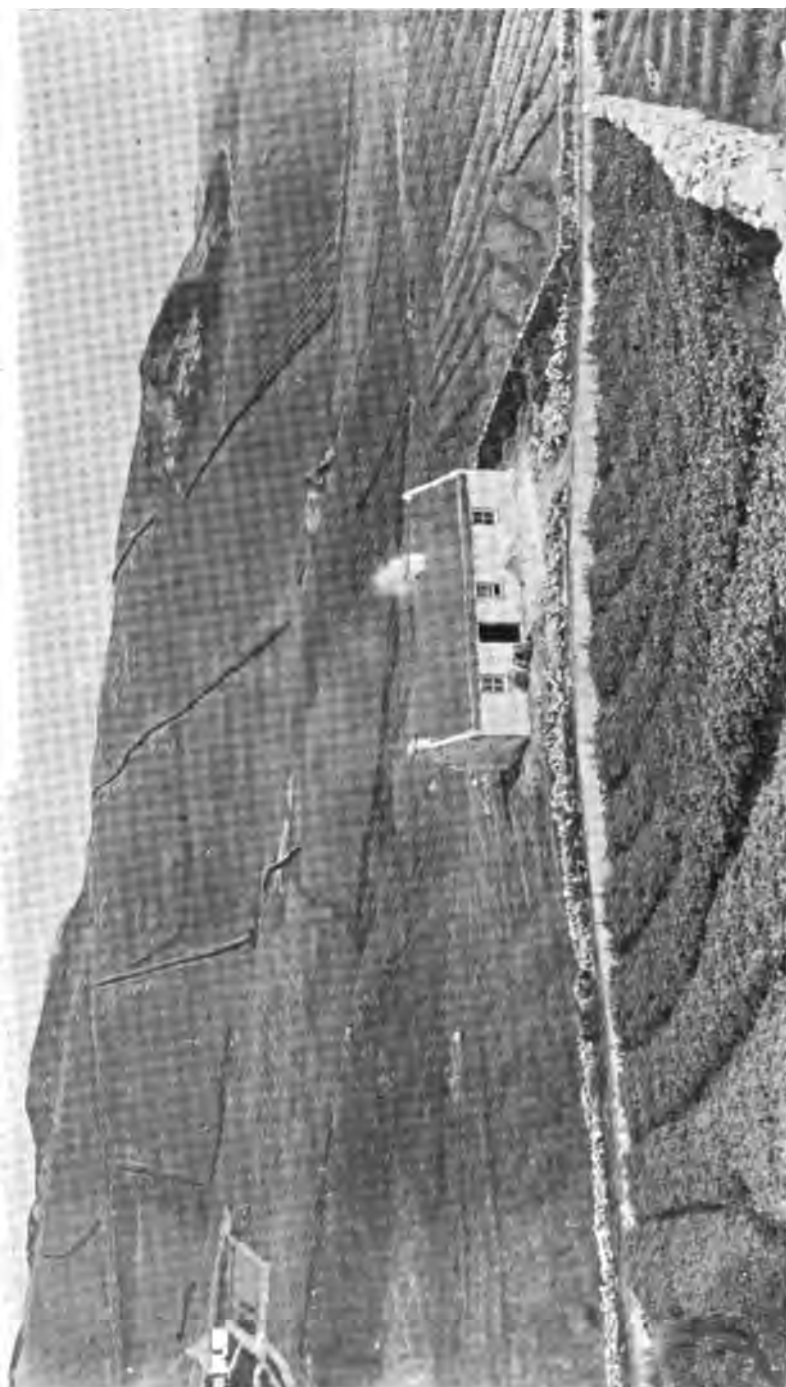
**The Dillon
Estate.**

direction by the purchase of the Dillon Estate of over 90,000 acres, chiefly in County Mayo, for the sum of £290,000, which was sixteen years' purchase of the net rental. The tenants on this estate number 4,200, of whom more than half pay rents of £4 or less, and a still larger majority are migratory labourers whose holdings are too small to support them. Most of the holdings consist of poor land, capable of considerable improvement by reclamation, drainage, and improved methods of husbandry. The first necessity was drainage, some thousands of acres of low land being practically useless owing to constant flooding. The tenants individually could not make the necessary main or arterial drains, or deepen the beds of the rivers—such works could be carried out only by the owner of the estate. In view of these circumstances the Board have commenced extensive drainage operations, and by the expenditure of a few hundred pounds the productive value of hundreds of acres in different parts of the estate, has already been doubled.



CLARE ISLAND.
Wall Separating Farms from Mountain Commonage.

Photo, C. Green.



CLARE ISLAND.
A New Farm House and "Stripes" running from the Shore to the Mountain Commonage.

Photo. C. Green.

As regards migration on lands not purchased by the Board, the object of which is to reduce "congestion" by enlarging existing holdings, the Board have, first of all, to acquire some holdings which some of the small farmers in the neighbourhood are willing to take in exchange for their existing holdings, which are then divided up among the adjoining farms. The action of the Board is confined of course to cases where the landlord also will consent to these changes, and the Board have also to make arrangements that the landlord shall get from the enlarged holdings the amount of rent which he had previously derived from the original holdings. It will be seen that the selection of migrants, where the changes are not confined to tenants on estates purchased by the Board, is a troublesome matter and requires much careful negotiation. Another point the Board has to see, to in nearly every case, is that the tenants thus settled have some working capital, without which the land is of little use to them. It is for this reason that the Board have advanced a loan of about £2,000 to twenty-five agricultural banks, which issue numerous small loans to their members—the very poor—who could not obtain credit elsewhere. The profit to the individual borrowers is generally very considerable, and so far no losses have been incurred by the banks—indeed, in every case a small profit has been made and carried to the reserve fund.

The Board has, of course, paid particular attention to improving the methods of cultivation in vogue in the congested districts. During the past year seven Agricultural Inspectors were employed, and in addition to advising small landholders as to the management and improvement of their land and stock, and lending farm implements, they inspect animals issued under the various schemes, and in 1899 had charge of thirty-one example holdings, and about five hundred experimental and example plots. The work on some example holdings consists chiefly of permanent improvements, draining, levelling, and clearing away rocks; in others small grants of seeds and manures are made for the purpose of inducing the occupiers to try a better rotation of crops, or to grow crops such as mangolds or new varieties of potatoes, which may not be sufficiently known in the district. Considerable attention has been given to potatoes, which form the staple crop in large districts, and on which many are entirely dependent for food. In view of the almost invariably beneficial effects of spraying, and of the ever-recurring danger of a wet season, every effort has been made to encourage the practice of spraying, and about £5,000 has been spent in this connection.

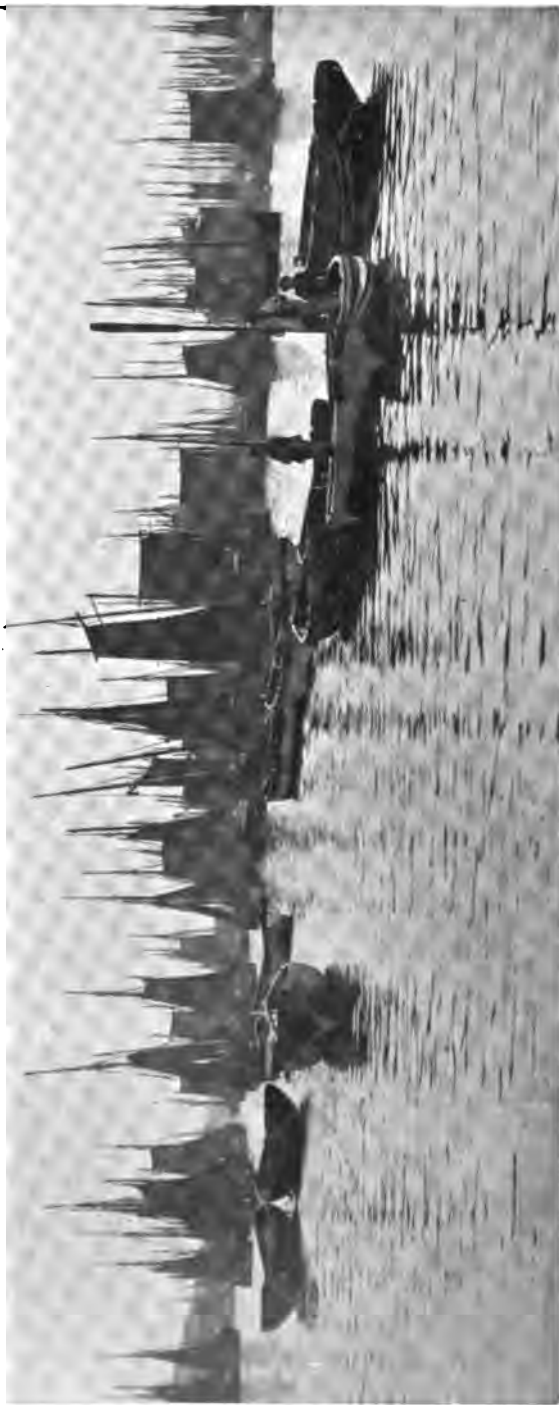
One of the chief needs of the congested districts was an improvement in the quality of the live stock, especially of the horses. In order to promote the horse-breeding industry, the Board bought a large number of stallions which are stationed during the season at different places in the congested districts for the purpose of serving mares belonging to the inhabitants at a very small fee. These operations have been carried out on an extensive scale, and about £45,000 has been expended up to 31st March, 1900, in this direction. The selection of stallions suitable to the districts has been considerably criticised, and though it is generally admitted that the state of affairs in the congested districts, especially the small and weedy class of mares so common there, called for different methods from those prevailing in the great hunting centres, the large number of hackney sires bought by the Board greatly accentuated "the Battle of the Stallions."

Some have objected to the introduction of hackneys at all, and others whilst admitting that they might benefit the breed common in the West of Ireland, base their objection on the danger of the hackney strain spreading from the congested districts into the great hunter-raising districts. It is satisfactory to learn from the Reports of the Board that the young stock got by these stallions have been carefully watched, and that in no case has any want of staying power in the half-bred hackneys been alleged. The Board's chief difficulty was, and is, the tendency—unfortunately not confined to the congested districts—shown by small landholders of selling the best fillies and keeping the worst, generally the unsaleable ones, for breeding purposes. The last Report of the Congested Districts Board points out—"It must always be borne in mind that our work in connection with horse-breeding was commenced in a falling market, and that the tide only began to turn about a year ago, a fresh demand for cobs for mounted infantry having arisen since last season. Many of the best of the remounts purchased came from those districts in the West of Ireland which are served only by our horses, and in consequence the applications for horses to be sent to those and other districts have never been so urgent as in the beginning of the present year."

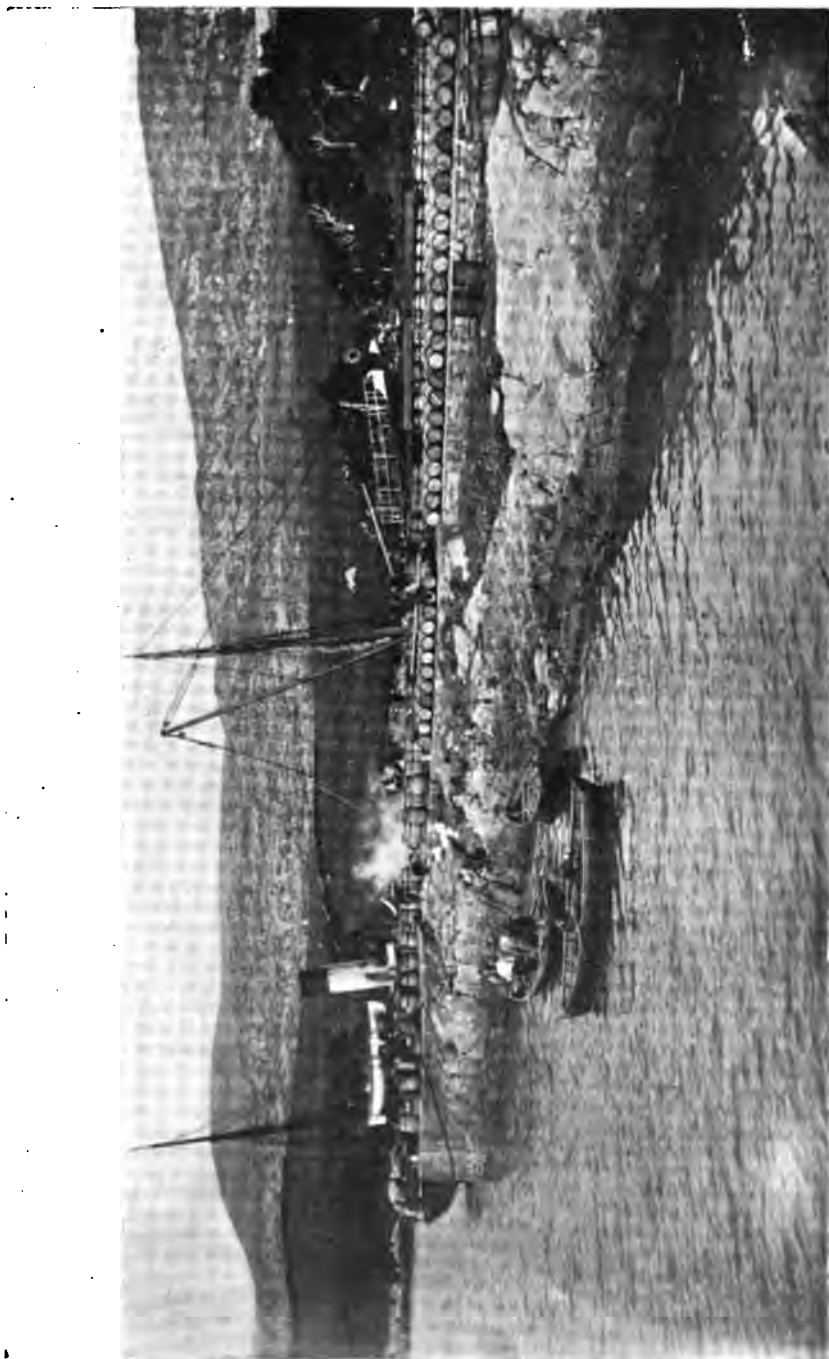
Since the Board commenced its work nearly £18,000 has been expended in aid of the breeding of live stock other than horses. The method of improving cattle found to be most successful is the purchase by the Board of good bulls at an average price of over £30. These animals are then re-sold to farmers in the congested districts at less than half the original price, the money being paid in two or three instalments. The chief condition of sale is that the purchaser shall keep the bull in the congested districts for at least two or three years, during which time he is to be available each year for the service of a stipulated number of cows, belonging to small farmers, at a maximum service fee of 2s. 6d. The farmer usually receives a subvention of £3 or £4 towards the cost of keeping the bull during the third year. Nearly eight hundred bulls have been sold outright under this system. and well-bred rams and boars have been similarly supplied in order to improve the breed of sheep and pigs.

Over £4,000 has been expended in improving the poultry and egg industry. At first the Board adopted the system of distributing among the people a large number of suitable fowl, but this method was soon found to be both too liberal and too expensive. Under the present scheme, adopted in 1893, a limited number of birds, generally twenty-two, of an approved breed, are sent out to one selected farmer or cottager in each small district. From the centre thus formed eggs of the pure breed are distributed, for hatching, to as many as possible of the surrounding cottagers. The inducement offered heretofore has been one penny paid by the Board to the distributor for every egg of the good breed issued by him, and, at the same time, he should get from his neighbour, under the arrangement agreed upon, an egg of the common country breed in exchange.

This system has now been some years in full operation, and in 1899-1900 no less than £400 was paid for eggs distributed, the number of eggs issued being over 98,000. The results are seen in the marked increase in the size of the eggs in many districts, and when the new system of grading eggs for market according to size becomes more general the improvement effected will be better appreciated by the people.



The Spring Mackerel Fleet in Berehaven.



**Mackerel, for American Market, being despatched from West Cove Pier, Co. Kerry,
built by Congested Districts Board.**

Photo. W. S. G.

The Board has also employed a poultry expert to visit and supervise these small poultry farms, and to instruct the people in the management of fowl, whilst considerable assistance has been given in the direction of marketing the eggs. This part of the Board's work is, perhaps more than any other, calculated to benefit the poorest class of small occupiers. Almost every householder keeps a few hens, and at the poultry farms a sitting of ordinary eggs can be exchanged for the same number of eggs of the best varieties; thus this scheme reaches even those who may not have any other live stock, and it does not require any payment on the part of those who wish to avail themselves of its benefits.

The Board made a start in 1893 towards developing the bee-keeping industry by supplying swarms of bees and suitable bee-frame hives to about a dozen cottagers, who were also instructed in the proper management of bees, and this experiment was attended with considerable success. In the following year the operations were extended, especially in county Donegal, and a number of persons were supplied with bee-keeping appliances and stock, which were paid for on the instalment system. As the industry spread it was seen by the Board that, in order to make the keeping of bees a profitable occupation for people in remote parts of the country, it was necessary to assist, for a couple of years at all events, in marketing the honey of any bee-keepers who were themselves unable to find a purchaser. This the Board was enabled to do through Sir Thomas Lipton buying at a favourable price all the honey the Board offered him. A number of local instructors are now spread all over the congested districts; whilst series of lectures, with magic lantern views, have helped to spread information on the subject, and to increase the popularity of the industry, the rapid development of which, in the last few years, is shown by the annual sale of bee-frame hives, which have risen from 80 in 1895 to 240 in 1899. Owing to the unusually long, dry and warm summer the season of 1899 was a most prosperous one for Irish bee-keepers. Many of the bee-keepers were beginners, yet the average produce per hive (nearly 66½ lbs.) was remarkably high, if not unprecedented, and, owing to the rapid growth of the industry, the number of hives was much larger than in any former year. The statistics obtained from bee-keepers working in connection with the scheme shows that the total quantity of honey sold by them was 59,936 lbs. In 1898 the production of honey was only 22,925 lbs., and the average only 54½ lbs. per hive, and in neither year do these figures include more than one-third of the honey produced in the congested districts.

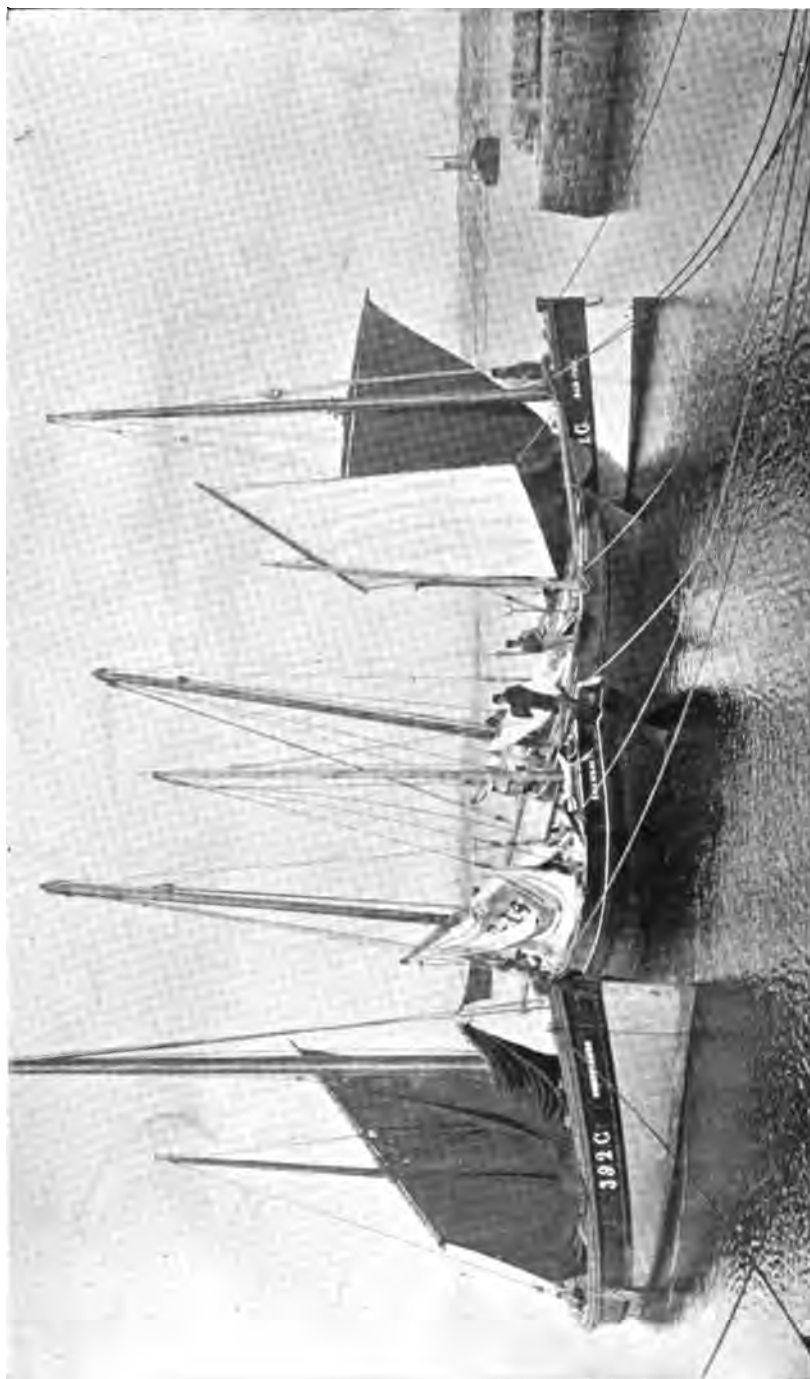
One of the first steps taken by the Congested Districts Board was to develop the resources which in the shape of sea fisheries lay almost at the door of so many of the "Congests." In considering the potentialities and drawbacks of this industry, the sea-coast of the congested districts may be divided into two divisions, in one of which, consisting of Galway, Mayo and Donegal, transit for fish and marketing facilities were defective; while in the other division, comprising Kerry and Cork, the means of transit both by rail and by steamship were far more complete, and in this district, therefore, a much more profitable market already existed than in the northern congested districts. Speaking generally, the Kerry and Cork fishermen needed landing accommodation for boats, more than market facilities, while as regards the coast north of Galway the establishment of a market was the chief necessity, though at the same time piers and boat slips were much wanted at some places.

The requirements of the fresh fish trade were of course different from those of the cured fish trade. The fresh fish trade requires quick and regular means of carriage to the English markets, and expensive plant—such as ice hulks, ice, and packing boxes—is also necessary. The cured fish trade, on the other hand, involves the erection of fish-curing sheds and stores, the hiring of fish-curers, and the purchase of salt, but there is not any necessity for rapid or regular transit to market, and a steamship or even sailing vessel can be chartered occasionally to take pickled or dried fish to the market.

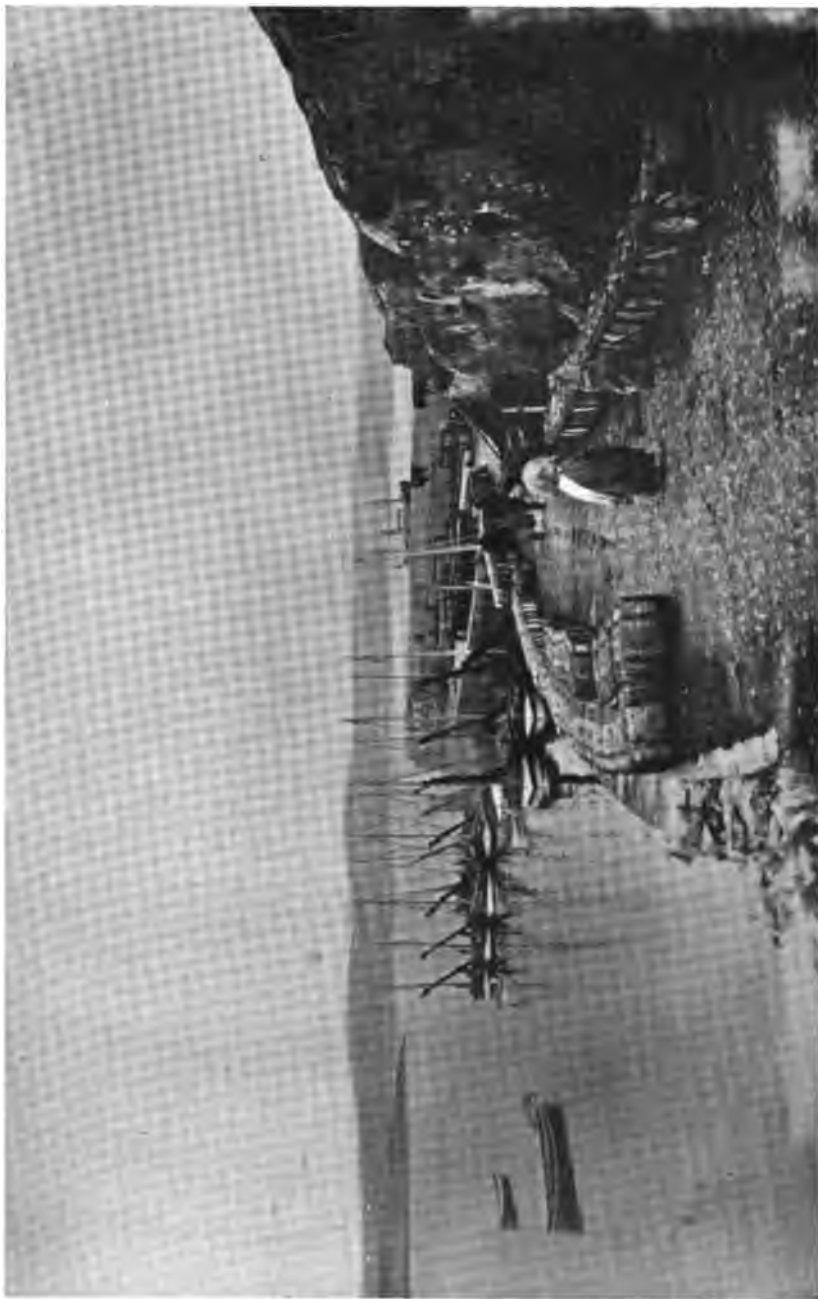
A start was made by the Board in Galway Bay, but it was soon evident that, even there where transit facilities were comparatively favourable, little less than the creation of the local industry was the task awaiting the Board; for to promote the fishing industry in such a way as to render it ultimately self-supporting, it was not only necessary to provide boats, but the men had to be shown also to a large extent how and especially when to fish. Thus, though the Aran islanders were accustomed to avail themselves of the Autumn Mackerel Fishery, in an elementary way, they scouted the idea of spring fishing. Another difficulty arose from the fact that most West of Ireland men are not sailors but only boatmen, and consequently by nature disinclined and unfit for fishing away from home. Fortunately the Board did not start their task of encouraging deep-sea fishing by, as was suggested by some, establishing schools to teach boys how to fish on dry land. Instead of this, seven Arklow crews, accustomed to deep-sea fishing, were subsidised to exploit the Spring Mackerel Fishery, and the Board bought a steamer to help, as well as boats, nets, boxes, and, not least important, a cargo of ice. After much weary waiting the mackerel came, and since then the fishing has flourished and become profitable on a self-supporting basis, for the Board has now ceased to act as the universal buyer, and private traders, with their own steamers and agents, have taken its place. The Board still supplies boats by means of loans from the Reproductive or Sea and Coast Fisheries Funds, repayable by half-yearly instalments. Two instructors generally form part of the crew, who teach the natives the complete art of fishing, and, above all, how to look after the gear and how to mend the nets. An important part of the Board's work arises out of the practical instruction which is given in the industries intimately connected with fishing, *e.g.*, net making, barrel making, and boat building.

These methods have been pursued with considerable success in most of the other fishing centres of the congested districts. Recently a new mackerel fishery has been opened at Blacksod Bay, and though the first season's working resulted in a loss of over £1,800, the Board very justly regard this as an investment which may in future years add considerably to the resources of the large and very poor population of the locality. The conger, skate, cod, ling, and glasson fishing at Teelin and Aran is very promising, and there is a very important herring fishery off Donegal, where the take last year was quite unprecedented, the net receipts of the fishermen being over £12,000. The Board has taken extensive measures to develop the cured fish trade, and a large business is now carried on, especially in mackerel, to America; but South Africa is said to be the most promising market of the future in this respect.

The Board has since its inception expended over £100,000 in engineering works, including marine works such as piers, harbours, drainage works, and roads and bridges. These works are not primarily of the class known as "relief," but have been undertaken rather with



Mackerel Boats, built in Connemara, of the Zulu and Nobby Types, by Local Builders, under direction of an Instructor.



Herring Boats of the Zulu Type, issued on the "Share System" at Dowlings Bay, Co. Donegal.

a view to develop and open up the resources of the districts by offering facilities to fishermen and agriculturists, and hence they have not been built in the objectless way which is characteristic of most relief works.

The development of home and cottage industries, such as spinning, weaving, knitting, and other industrial enterprises, constituted perhaps the most difficult duty entrusted to the Board both as regards the selection of fields of work and the carrying out of schemes for affording assistance. Besides the well-known woollen factory at Foxford and the hand tuft carpet making business at Killybegs, shirt making, knitting, crochet and lace work, kelp making, basket making, carpentry, and other home and cottage industries have all been started or developed. In some cases the Board found it necessary to give some direct assistance to the nascent industry, but in other cases technical instruction was the chief need; and when this was facilitated by the Board the industry required little further assistance. In most of these industries the actual pursuit of the trade and technical instruction in its wider sense now seem to go thoroughly hand in hand. A great boon was conferred upon girls in the congested districts by the starting of "Domestic Training" classes. It was the custom for many of the girls to go to the "hiring fairs" and engage themselves for service in the neighbouring counties. As the cottages in which the girls live when at home give them no opportunity of learning the ordinary work of domestic service, they are quite untrained, and are consequently put to rough work, and can obtain only low wages. To teach these girls cooking, laundry, and general housework, and to train them in habits of neatness and order so as to enable them to get better wages, are the objects of these classes, which have been very successful; in fact the only drawback alleged is that the supply is still inadequate, for despite the great demand for domestic servants in the neighbouring counties and in Dublin, where good wages might be earned, there is still a greater demand in the congested districts themselves for competent housewives, with the result that the girls trained have all got married out of hand.



An Arran Island Hooker in Galway Bay.

DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION.

Various suggestions had from time to time within the past decade or two been mooted for the establishment of a State Board or Department of Agriculture for Ireland. These suggestions first took practical shape when a number of Irishmen, representative of different political parties, resolved to form a Committee, for the promotion of measures, for the benefit of the country, in support of which a common agreement could be secured. This Committee, which was formed during the Parliamentary recess of 1896, was known as the Recess Committee, and it consisted of the following members :—

HON. HORACE PLUNKETT, M.P., *Chairman*.
 The EARL OF MAYO.
 The LORD MONTEAGLE, K.P.
 Right Hon. the LORD MAYOR of DUBLIN.
 Right Hon. THE O'CONOR DON, H.M.L.
 Right Hon. JOSEPH M. MEADE, LL.D.
 Right Hon. THOMAS SINCLAIR, D.L.
 Sir JOHN ARNOTT, Bart., D.L.
 Sir THOMAS LEA, Bart., M.P.
 JOHN REDMOND, M.P.
 JOHN H. PARNELL, M.P.
 RICHARD M. DANE, Q.C., M.P.
 WILLIAM FIELD, M.P.
 Hon. Mr. JUSTICE ROSS.
 Right Rev. MONSIGNOR MOLLOY, D.D.
 THOMAS ANDREWS.
 VALENTINE B. DILLON.
 C. LITTON FALKNER.
 Rev. T. A. FINLAY, S.J., F.R.U.I.
 THOMAS P. GILL.
 JOSEPH E. KENNY, M.D.
 H. BROUGHAM LEECH, LL.D.
 COUNT MOORE, D.L.

An Ulster Consultative Committee was formed in Belfast for the purpose of corresponding with the General Committee. The following were the members of the Ulster Committee :—

JAMES MUSGRAVE, D.L., *Chairman*.
 THOMAS ANDREWS.
 JAMES DEMPSEY.
 Sir DANIEL DIXON, Knt., D.L.
 Sir W. Q. EWART, Bart., D.L.
 JOHN FAGAN.
 MAURICE FITZGERALD (Professor, Queen's College, Belfast).
 Rev. R. R. KANE, D.D.
 ROBERT MACGEAGH, J.P.
 R. J. M'CONNELL, J.P.
 ALEX. ROBB.
 THOMAS ROE, J.P.
 Right Hon. THOMAS SINCLAIR, D.L.
 JOHN F. SMALL

Mr. Horace Plunkett was chosen as Chairman of the Recess Committee, and Mr. T. P. Gill acted as Hon. Secretary. The Committee set themselves to study systematically the methods adopted by the State in other countries for the development of agricultural and industrial resources, and to consider whether these methods might be adopted and adapted to the special conditions of Ireland. As a result of their deliberations the Recess Committee drew up and presented to the Irish Government a "Report on the Establishment of a Department of Agriculture and Industries for Ireland," which made the following recommendations :

- (1.) That the administration of State aid to Agriculture and Industries in Ireland on the principles to be described can be most effectively carried out by including the two branches of Agriculture and Industries, and the Technical Instruction relating thereto, under the care of one Department of Government specially created for the purpose ; and
- (2.) That this Department should consist of a Board with a Minister of Agriculture and Industries responsible to Parliament at its head, and assisted by a Consultative Council representative of the agricultural and industrial interests of the country.

The recommendations of the Committee, were taken up warmly by public opinion of all shades in Ireland, and especially by the bodies representative of agriculture, commerce, and industry. A very important deputation organized by the Chambers of Commerce of Dublin, Belfast, and Cork, and representing the agricultural and commercial interests throughout the country generally, waited on the Chief Secretary, Mr. Gerald Balfour, in January, 1897, who received them graciously, and promised legislation on the part of the Government.

In the Session of 1899 the Chief Secretary introduced and carried through Parliament a Bill for the establishment of a Department of Agriculture and Technical Instruction for Ireland, which embodied the main features of the Recess Committee's recommendations, and adapted them to the new circumstances created in Ireland by the Local Government Act, which the same Minister had carried through Parliament the previous Session. A brief outline of the varied duties and functions of this new State Department is given here—though it must necessarily be of a very summary character. One side of the duty of the Department is to carry on certain veterinary, fishery, statistical, and educational work, which was, at the time of the passing of the Act, divided up amongst some half-dozen State departments, but a large share of its duties is almost entirely new, so far as State action is concerned, and is connected with the development of "Agriculture and other Industries and Technical Instruction," words which receive a very liberal interpretation in the definition clause. Towards carrying out this work, the Department received a capital sum of about £200,000, and has an annual endowment of £166,000. The salaries and allowances of the staff required

for the work of the Department, including the transferred duties, are voted by Parliament and included in the ordinary Civil Service Estimates. The Department consists of a President (the Chief Secretary for the time being) and a Vice-President, who are assisted by a Secretary, two Assistant Secretaries, one in respect of Agriculture and one in respect of Technical Instruction, together with a number of "Inspectors, Instructors, Officers, and Servants."

The very nature of the work which the new Department was called into existence to accomplish made it absolutely essential that the Department should keep in touch with the public opinion of the classes whom its work would concern, and without whose active co-operation no lasting good could be effected. The machinery for this purpose was provided by the establishment of a Council of Agriculture and two Boards, one concerned with Agriculture and the other with Technical Instruction. These representative bodies, whose constitution is interesting as marking a new departure in the administrative system of the United Kingdom, were adapted from Continental models. As the Vice-President said in his opening address at the inaugural meeting of the Council last year:—"Similar Councils, to advise and influence similar Departments, have been found by experience in the Continental countries, who are Ireland's economic rivals, to be the most valuable of all means whereby the administration keeps in touch with the opinions of the agricultural and industrial classes, and becomes truly responsive to their needs and wishes."

The Council of Agriculture is mainly elective, and is built out of the newly-established system of Local Government. It consists of 104 members, of whom 68 are elected by the County Councils, and 34 are nominated by the Department. The President and Vice-President of the Department are *ex-officio* members of the Council and of both Boards. The members of the Council are elected for a term of three years, and according to the Act, "shall meet at least once a year for the purpose of discussing matters of public interest in connection with any of the purposes of this Act."

Where the Council differs from its foreign prototypes is, mainly, in the greater amount of direct power which has been entrusted to it. Besides its advisory powers—and the importance to be attached to the deliberate opinion of such a representative body is naturally very great—the Council itself creates the larger portion of the Agricultural Board, and shares with the County Boroughs the appointment of the majority of members of the Board of Technical Instruction, and to these Boards is entrusted the control of the funds with which the Department has been endowed. The two Boards consist of 14 and 23 members respectively, of whom two, as already noted, are *ex-officio*, four are nominated by the Department, and the remainder are appointed either by the Council of Agriculture or directly by the Councils of the County Boroughs and Urban Districts, whilst the Commissioners of National Education and the Intermediate Education Board each send one representative to the Board of Technical Instruction. The members of the Council and of the two Boards are unpaid, and receive only the usual travelling and subsistence allowances when engaged upon their official duties. In addition to special advisory powers, the two Boards, as was pointed out by Mr. Gerald Balfour, the first President of the Department, occupy precisely the same position

in reference to the Department as regards financial matters that the House of Commons holds in reference to the Government of the day. No money can be spent, except as regards a few minor matters, without their consent. Of the Department's annual income of £166,000, the sum of £55,000 is ear-marked for technical instruction. This sum is to be divided into portions, to be determined every three years by the Department, with the concurrence of the Board of Technical Instruction. As regards one portion, the Board's functions then cease. This portion is divided amongst the six County Boroughs, viz.:—Belfast, Cork, Dublin, Limerick, Londonderry, and Waterford, according to their population, "in or about the time of distribution," and is applied by the Councils of these boroughs (through a Technical Instruction Committee), as they think fit, to any scheme of Technical education which meets with the approval of the Department. The other portion is to be applied for the purposes of Technical Instruction elsewhere than in the County Boroughs, subject to the concurrence of the Board of Technical Instruction, who thus occupy with regard to this portion the position of the Department in reference to the other portion.

The Agricultural Board has a power of veto over the expenditure of the greater part of the Department's funds. As already explained, these funds consist of a capital sum of about £200,000, and an annual income of £166,000. Of the capital sum, £15,000 was assigned by the Act to the Royal Veterinary College of Ireland*, and £10,000 was allocated to certain purposes in connection with the development of the Munster Institute. Of the annual income of £166,000, the sum of £55,000 is, as already mentioned, to be devoted to Technical Instruction, and £10,000 to Sea Fisheries. The residues—about £175,000 (capital sum) and £101,000 (annual sum)—are, after meeting the cost of a few minor items, to be devoted by the Department "for the purposes of Agriculture and other rural industries or Sea Fisheries," subject to the concurrence of the Agricultural Board. It may be noted here that it is specifically provided in the Act that none of the funds thus placed at the disposal of the Department are to be spent in Congested Districts, which is especially provided for by the Congested Districts Board. To prevent, however, any overlapping of the work of this Board and the Department, it is provided that the latter may undertake any of the Board's powers and duties at its request, but any expense which is incurred in performing these functions must be provided by the Board or from local sources.

It was not at all desired by the members of the Recess Committee, nor was it intended by the Government, that the Department should ever become a body existing merely for the purpose of administering State subsidies: its function was rather in the words of the Vice-President to be that of "helping people to help themselves." Hence the Act expressly prohibited the Department from applying (except in special cases) any of its funds to schemes in respect of which aid is not given out of money provided by local authorities or from other local sources. Accordingly, the Act empowers local authorities to levy a rate of one penny in the pound for the purposes of the Act, and it also provides that, notwithstanding anything in the Technical Instruction Acts, 1889 and 1891, the rate raised for the purposes of

* The Royal Veterinary College of Ireland was incorporated by Charter in 1886 but was formally opened only last year. It has no power of granting Diplomas, but is affiliated to the Royal College of Veterinary Surgeons.

those Acts in a rural district may, if the County Council think fit, be applied for any of the purposes of this Act.

The result is that the Councils of every urban district and of every county may levy a rate of twopence in the pound (consisting of one penny levied under the Technical Instruction Acts, 1889 and 1891, and one penny levied under the Agriculture and Technical Instruction (Ireland) Act, 1889), and the sum thus raised may be applied in urban districts for Technical Instruction, and in rural districts for Technical Instruction and for the purposes of agriculture and other rural industries. Extensive borrowing powers for the same purposes are also conferred by the Act upon the local Councils. An universal rate of one penny in the pound all over Ireland would produce a sum of nearly £60,000, and as the Department's contribution to any particular scheme will in general be proportioned to the amount of local aid forthcoming, the local Councils throughout Ireland have the power of setting free a very considerable amount of money to assist in the work of national development.

The powers of the Councils are not confined to deciding whether any district will tax itself, and so become eligible to share in the benefits that may result from the action of the Department. These Councils will be the real executive. To the Councils, or, rather, to committees appointed by the Council to represent the various interests in any district, is entrusted the task of preparing, in conjunction with the Department, schemes for the furtherance of the objects of the Act, and to these same bodies will be entrusted the administration of the schemes. It is thus evident that the successful working of the Act, and, indeed, its working at all, depends mainly upon the co-operation of local bodies.

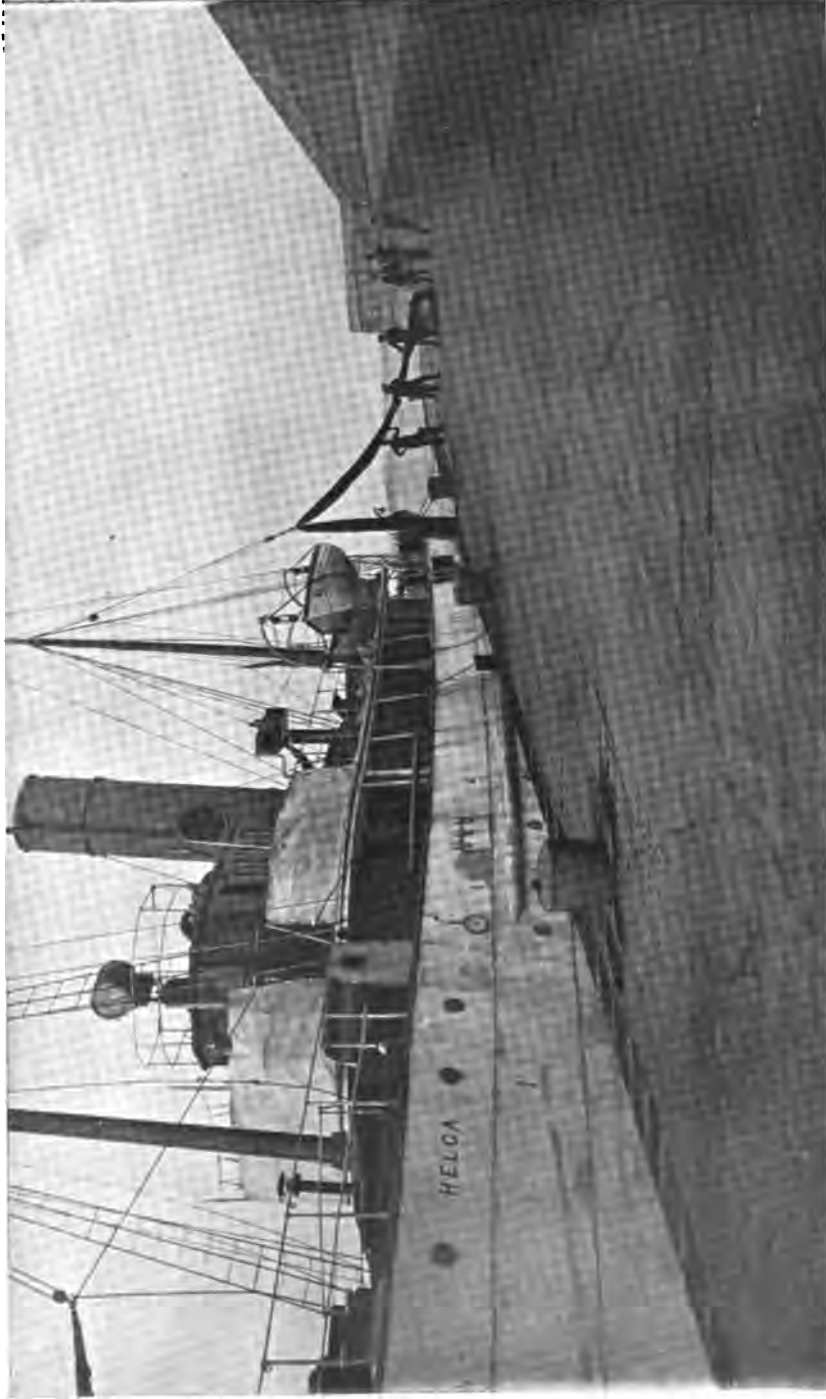
The transferred powers and duties of the Department, to which reference has already been made, may be considered in five classes:—

1. The powers and duties of the Veterinary Department of the Privy Council. These powers arise chiefly out of various Diseases of Animals Acts, the object of which was to stamp out certain infectious disease amongst animals. These powers are very extensive, and include the right of prohibiting the importation into this country of animals from foreign countries; of declaring that any area in Ireland is affected with a particular disease, and of regulating the movement of animals in such area; and of slaughtering every animal affected, or suspected to be affected, with certain diseases; in such cases compensation is made to the owner, partly out of money provided by Parliament, but partly out of a fund raised by local assessments. These measures have resulted in freedom from pleuro-pneumonia* for over eight years and from foot and mouth disease for about seventeen years, though the latter has more than once made its appearance in Great Britain during this time. Swine fever and sheep scab are the diseases which now cause most trouble, and the estimates for the year 1901-2 include a sum of £12,000 for expenses in connection with the suppression of swine fever. Other duties of the Privy Council which have been transferred to the Department are connected with the supervision of the transit of animals both by land and sea, and with the carrying out of the Destructive Insect Act and the Fertilisers and Feedings Stuffs

* The Contagious Diseases (Pleuro-Pneumonia) Act, came into operation on 1st September, 1890, and the disease was completely eradicated in two years. During this time over 10,000 cattle were slaughtered, the net compensation for which amounted to over £70,000.



**The Twin Screw Cruiser "HELGA" of the Department of Agriculture and Technical Instruction for Ireland.
For the purpose of protecting the Irish Fishery Grounds against illegal Trawling and for the purpose of scientific marine investigation.**



The Cruiser "Helga" landing a captured Trawl on Clogher Head Pier, Co. Louth.

Act. The former Act was intended to prevent the introduction and spread of the Colorado beetle, which is very destructive to the crops. The latter Act was aimed at securing the purity of substances sold either for enriching the land or for feeding animals, and the Department is authorised to prosecute in cases of fraud and adulteration.

2. The powers and duties of the Inspectors of Irish Fisheries. These inspectors were first appointed in 1869, when they took over the duties of various Commissioners in relation to fisheries, and they have been chiefly concerned with the administration of the rather complicated fishery laws, which are contained in some eighteen statutes, ranging from 1842-1898. Under the 16th section of the Act, an annual sum of £10,000 is to be devoted out of the Department's income to the development of Irish Fisheries, and a special advisory committee has been appointed by the Department to help in this work. A Bill has been introduced into Parliament to extend the Department's powers in connection with trawling, and in consequence of the necessity of having a steamer to carry out fishery investigations and general marine superintendence (work which in Scotland keeps three cruisers belonging to the Fishery Board busily employed), the steam yacht *Helga*, a very speedy steel twin-screw, schooner-rigged boat, with a tonnage (yacht measurement) of 345 tons, has been purchased.

3. The powers and duties of the Registrar-General for Ireland and of the Irish Land Commission with reference to the collection and publication of agricultural and cognate statistics, and the powers and duties of the Land Commission under the Market and Fairs Acts of 1887 and 1891. These Acts impose upon the market authorities the duty of keeping machines for weighing cattle (except when exempted by the Central Authority), and of furnishing certain returns as to the animals sold in each market.

A Statistics and Intelligence Branch has been formed by the Department, as recommended in the Report of the Recess Committee, to deal with all Irish agricultural and industrial statistics. The Branch carries on the compilation of the General Agricultural Statistics which have been collected by successive Registrars-General, with the assistance of the police, who act as enumerators, for over half a century. A preliminary report is published in the autumn, which shows by provinces, counties, and poor law unions, the area under each crop. A return is published later showing the estimated rate of produce, and finally, the complete report, which contains information as to the division of lands, the acreage under crops and pasture, the extent of woods, plantations, bogs, and waste land, and the number of occupiers and the size of their holdings. It incorporates the figures collected by the Veterinary Department in connection with the exports and imports of live stock, gives details of the produce of the crops and of the number of live stock in the country, and of other matters relating to agriculture. An annual report upon the Migratory Labourers, a report upon the average prices obtained at the chief markets for live stock, and certain kinds of agricultural produce, and two half-yearly reports upon the banking, railway, and shipping statistics

of Ireland are also issued. The fifth section of the Act authorises the Department to make, or aid in making, any inquiries, experiments, and research, and to collect any information that may be deemed important for the promotion of agriculture and rural industries, and this is carried out chiefly by the Statistics and Intelligence Branch, which is in touch with similar institutions in the Colonies and abroad, and which disseminates the information acquired by means of leaflets and other publications, including its *Quarterly Journal* of which four numbers—forming Vol. I.—have already appeared. The Vice-President of the Department, in his opening speech at the inaugural meeting of the Council of Agriculture, laid particular stress upon the importance of the Intelligence Branch. "Not less important," he said, "than the statistical work of the Department will be that of its Intelligence Bureau. For we are suffering, not merely from our lack of scientific methods, but also from the competition of State-aided rivals the world over—men who have had the start of us industrially, and who are alert to avail themselves of every assistance that science and Government supervision can bring to their industry. We have the experience of these men and these countries to draw on, and we intend, through our Intelligence Bureau, to draw on it largely. By leaflet, by bulletin, through its *Journal* and other publications the Department will make a constant effort to bring home to every farmer in the country the progress of his rivals, and to interpret for him how the causes of such progress may be applied to his own conditions, or modified to meet varying circumstances."

4. The powers and duties of the Commissioners of National Education with regard to practical Agricultural Education. These Commissioners have charge of the Irish primary schools, and at one time carried on a fairly extensive system of agricultural instruction, both in the primary schools and in some twenty provincial model farms. Of these latter, two only have survived, the Albert Institution near Dublin, and the Munster Institution near Cork, and in the primary schools object lessons and elementary science (with special reference in rural districts to the principles underlying agriculture and horticulture) have been recently substituted for the teaching of agriculture itself.

One of the various grants which go to make up the total income of the Department, a sum of £6,000 represents the annual amount hitherto spent on the Albert and Munster Institutions, which are to be carried on and developed by the Department in connection with its great work of developing Irish agriculture, and, as already noted, a capital sum of £10,000 is to be devoted towards the development and extension of the Munster Institution.

5. The powers and duties of the Department of Science and Art in relation to the institutions in Ireland under their control. These are the Royal College of Science, the Science and Art Museum, the National Library, the Metropolitan School of Art, and the Royal Botanic Gardens at Glasnevin. Most of these institutions are offshoots of the Royal Dublin Society, and an account of them will be found elsewhere.

6. The administration of the grants for Science and Art and for Technical Instruction in Ireland, which were formerly adminis-

tered by the Department of Science and Art. Some Information as to the state of Science Teaching and Technical Instruction in Ireland is contained in the article on this subject*, which gives the history of these grants in Ireland, and points out that they have not been availed of as much as they might have been, largely because the conditions imposed upon classes were not suitable to the needs of Ireland. The Department have already issued new Regulations for these grants because, as they state in a circular letter to the managers and head teachers of secondary schools, they consider that the methods of assessing the grants might with advantage be changed in order to render it more directly applicable to existing educational needs in Ireland. In the main, the new Regulations form a scheme of payments, based on the results of inspection, for instruction in Experimental Science, Drawing, and Manual Work or Household Economy. A detailed programme of study which all schools should follow has not been issued, as the Department are of opinion that it is advantageous that the variety of arrangements, made possible by an elastic system of payments, no less than the variety of schools, should lead to variety of programme; and it is hoped that, in this way, opportunities will be afforded to each school to stamp its individuality on the character of the instruction, and, accordingly, managers will be allowed considerable latitude in modification of details.

The various local authorities throughout Ireland, both in the county boroughs and elsewhere, are now framing, in conjunction with the Department, schemes for the promotion of technical instruction, for which, as already noted, one-third of the income of the Department is specifically assigned. The expression "Technical Instruction" includes instruction in the principles of science and art applicable to industries, and in the application of special branches of science and art to specific industries or employments, as well as instruction in the use of tools, and modelling in clay, wood, or other material, but it does not include instruction given in elementary schools or teaching the practice of any trade or industry or employment. These schemes will no doubt be framed with due regard to the desirability of enabling the classes started under them to qualify for these remodelled Science and Art grants, so far as the syllabus of the school coincides with the subjects for which these grants are given, and the sum of £55,000 will of course be also supplemented by the Technical Instruction Grant mentioned on page 112, as well by local contributions. A Departmental Committee is at present inquiring into the whole subject of the reorganisation of the Royal College of Science, which will carry on the higher scientific and technical instruction, and form, as it were, the apex of the educational structure over which the Department exercises direct control.

The 23rd section of the Act established a consultative Committee of Education, consisting of the Vice-President of the Department and a representative of the Commissioners of National Education, the Intermediate Education Board, the Agricultural Board, and the Board of Technical Instruction. This Committee is appointed for the purpose of co-ordinating Irish educational administration. It is unnecessary to dwell on the intimate connection between the different educational interests represented on the Committee. The article on

* See pages 108 112.

Science Teaching and Technical Instruction in Ireland,* already alluded to, shows how this class of education has been affected by the nature of the Primary and general Secondary education in Ireland. Accordingly, the operations of this Committee are of the greatest importance, and already, as a result of their deliberations, an arrangement has been arrived at between the Intermediate Education Board and the Department for co-ordinating the Science syllabus of the two bodies. The Intermediate Education Board have decided that Natural Philosophy, Chemistry, and Drawing shall be replaced in their Programme by one subject, viz.:—"Experimental Science and Drawing," and that after the present year the Board shall not, until further notice, hold any examination in this subject, but shall accept the inspection, and where necessary the examination of the Department.

Whilst, as regards urban industries, the action of the Department is restricted to the promotion of technical instruction in connection with them, there are no such restrictions as to developing agriculture and other rural industries, an expression which is defined in the Act as including the aiding, improving, and developing of agriculture, horticulture, forestry, dairying, the breeding of horses, cattle and other live stock and poultry, home and cottage industries, the cultivation and preparation of flax, inland fisheries, and any industries immediately connected with and subservient to any of the said matters and any instruction relating thereto, and also the aiding or facilitating of the carriage and distribution of produce. Three special Committees have been formed by the Department from the members of the Council of Agriculture and other experts to deal with three important questions—horse-breeding, live stock other than horses, and flax. These Committees have drawn up special schemes for improving the breeds of horses and other animals, which include the nomination of mares for service, at reduced fees by approved sires, and the awarding of prizes to young stock at local agricultural shows. The Department and the Agricultural Board have allocated over £17,000 out of the Department's income in aid of these schemes, which are also helped in the different counties by contributions out of the rates. The Department have secured the services of Professor Nocard, the eminent veterinarian, to direct the investigation which they are carrying out as to the causes of the present excessive calf mortality in Ireland, and an inquiry has been already held into the quality of the flax seed usually supplied to the Northern farmers, and into the suitability of Ireland for tobacco culture. Sufficient time has not yet elapsed for many local authorities to put in force the various schemes which they, in conjunction with the Department, have been preparing, but it is understood that these schemes when fully completed will embrace an extensive system of agricultural education, as well as the establishment of experiment and seed-testing stations, and example plots, with peripatetic lecturers to explain the practical bearing of the experiments—in fact, all the methods which experience has shown elsewhere to be most efficacious for developing agriculture in all its phases.

Finally, the Department is given certain powers as regards transit facilities, and is authorised to take such steps as it thinks proper for appearing as complainant on behalf of any persons aggrieved in reference to any matter (other than a matter affecting the Postmaster-General), which the Railway and Canal Commissioners have jurisdic-

* See pages 108-112.

tion to hear and determine. These Commissioners have jurisdiction over, *inter alia*, the following matters:—

(i.) The failure of any railway or canal company to afford reasonable facilities for the receiving, forwarding, and delivering of traffic upon the railways or canals worked by it.

(ii.) Any undue preference given to any particular person or companies, or to any particular traffic whatsoever.

(iii.) Any failure of a railway or canal company to afford all due and reasonable facilities for receiving and forwarding through traffic, or to fix and establish just and reasonable through rates.

(iv.) Any contravention by a railway or canal company of any enactment contained in their special Act:—

(a) Relating to traffic facilities and undue preference;

(b) Requiring it to provide any station, road, or other similar work for public accommodation; or

(c) Imposing upon it any obligation in favour of the public, or any individual.

(vi.) Any neglect on the part of a railway or canal company to publish and keep at its stations and wharves books of rates for public inspection, and printed copies thereof for sale.

(vii.) Any charge sought to be made by any railway or canal company in respect of the carriage of goods or animals, or in respect of terminal services, which such company is not entitled to make.

The Commissioners have power to order any company to fulfil its duty, or to grant an injunction restraining it from disobedience; and in certain cases they can award damages to the party aggrieved. They are further empowered to direct two or more companies to carry out any order which they may make, and for that purpose to submit a joint scheme for their approval.

THE DUBLIN MUSEUM OF SCIENCE AND ART.

The Dublin Museum is one of a great group of institutions surrounding a fine old mansion known as Leinster House, for many years the town residence of the Marquises of Kildare, afterwards Dukes of Leinster. A great part of the gardens on the east side are still kept up as a public recreation ground, bounded on one side by the National Gallery of Ireland, and on the other by the Natural History portion of the Museum; whilst on the west side lies the new Museum building containing the Art and Industrial Collections, and opposite to this the National Library of Ireland and the Metropolitan School of Art. Thus these Institutions of Science and Art form, from the architectural and picturesque, as well as from an Educational point of view, one of the most interesting centres of the city. The Museum has to meet the wants which, in Edinburgh, are catered for by two Museums, and in London by five, and the available space has to be economized to the utmost, and every possible effort made to arrange all parts of the Collections in a very systematic manner, or they would soon become almost useless masses of heterogeneous objects. The Collections may be regarded under the following seven principal heads:—Architectural and Decorative Art; Ethnology; Machinery and Mechanical Arts, usually classed as Industrial; Irish Antiquities; Zoology; Botany; Geology and Mineralogy.

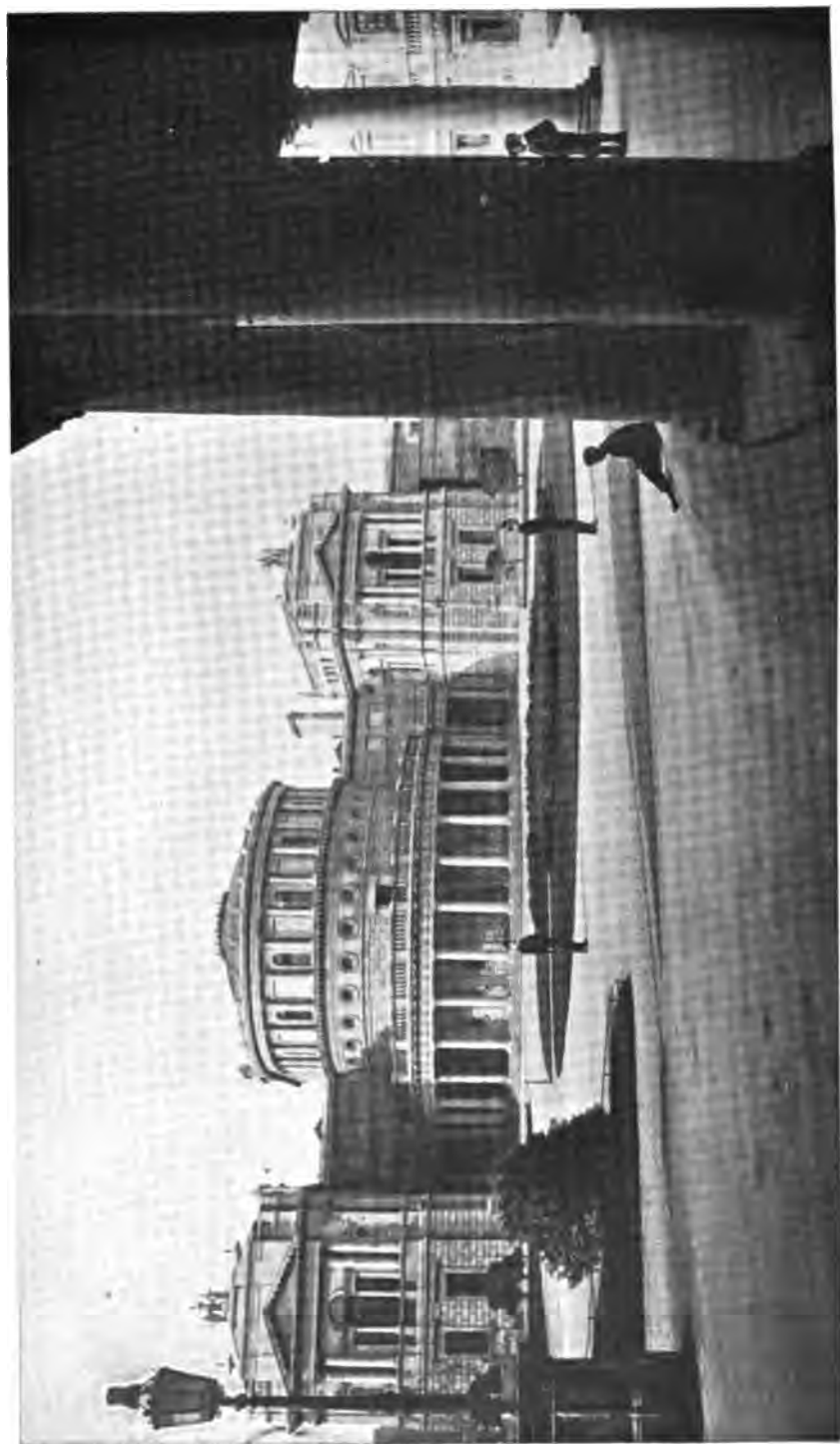
ARCHITECTURAL AND DECORATIVE ART.

EGYPTIAN ANTIQUITIES.—This collection, though small, contains many objects of great interest, and readers of books on Ancient Egypt will find in it examples of the Arts of that country from prehistoric to Roman times, which will enable them to understand better, and appreciate more fully, what they read, and an inspection of them may take the place to some extent, of an examination of the larger collections in the British Museum or the Louvre.

GREEK AND ROMAN ANTIQUITIES.—These collections are of very great value, and modellers, jewellers, and workers in silver and bronze may derive from their inspection many useful lessons; while at the same time they should, like the Egyptian Antiquities, enable classical students to take more intelligent interest in their studies.

IRISH ARCHITECTURE.—Of the very interesting Irish Romanesque which flourished from the ninth to the twelfth century in this country, we have, unfortunately, no examples, except photographs; but it is intended to supply at once this deficiency. Of the Great Irish Crosses there is a very good cast of one of the very best at Monasterboice, and it is hoped that ere long many others will be modelled.

GOTHIC ARCHITECTURE.—There are a few specimens from the grand French cathedrals which should be very useful and instructive to ecclesiastical architects.



National Library of Ireland, Kildare Street, Dublin.



Museum of Science and Art, Dublin.

RENAISSANCE AND SUBSEQUENT WORK.—Of the works of the great sculptors of the fifteenth and following centuries in Italy and France there are many important copies in the Museum, comprising statues by D. da Settignano, Donatello, Michael Angelo, L. Della Robbia, Goujon, Pilon, and others, and carefully coloured models of some of the most celebrated examples of decoration in Italian ecclesiastical buildings. The collections of Gems and Cameos, and of Coins and Medals, are good, and very useful to those who have little opportunity of studying larger collections.

INDIAN AND OTHER ORIENTAL ART.—The fine metal work from various parts of India and from Thibet, the specimens of Needle-work and Textiles, and the varied patterns of the delicate relief work of Moghul times in the casts from their ancient seats of government are valuable examples of Oriental taste, design and workmanship.

JEWELLERY.—There are four cases of Jewellery: Greek and Roman style, English and Irish, foreign and peasant Jewellery. In the first are a copy of the very fine Greek monile or necklet in the British Museum, and reproductions of some of the very remarkable ancient Etruscan ornaments by the late Carlo Giuliano.

MUSICAL INSTRUMENTS.—Here there are instruments of many primitive and barbarous nations, which are interesting to ethnologists and to those who would study how the percussion, wind and string instruments of the present European orchestra have been evolved from very simple beginnings, and there are more modern instruments, which illustrate the history of their manufacture in Dublin, such as the Irish harp at various epochs, the Irish bag-pipes and spinets and early pianofortes made in Dublin.

FURNITURE.—This is a branch of the Museum which has been greatly increased during the last five years, and now comprises a number of good examples of Italian furniture of the sixteenth and seventeenth centuries, of French chiefly of the time of Louis XIV., Louis XV. and Louis XVI., and of English of the Stuart and Queen Anne periods, and more especially of the times of Chippendale and his immediate successors. It is hoped that these specimens will not only serve as a high standard of good design and fine workmanship to the furniture makers of Ireland, but will afford, what is much more necessary, examples of good taste to the public, on whom it must ultimately depend on what lines the making of furniture will be carried on in future.

POTTERY AND PORCELAIN.—Of Ceramics there is a fairly complete collection of almost every make, in which persons interested in this artistic craft can see the various materials, glazes, and methods of decorating and colouring, as well as the very different roads by which different peoples at different times have imparted, or tried to impart, artistic value to their productions.

In the collection of Glass there are numerous specimens of old Venetian of most delicate workmanship, some interesting Persian pieces, and one of the best examples that can anywhere be seen of the fine glass lamps that used to hang in the Mosques of Cairo, and of which several are now the glory of the Arab Museum in that city. There are several specimens of Irish manufacture, chiefly from the factories which flourished in Waterford during the latter part of the eighteenth century.

ARMS AND ARMOUR.—In this part of the collection there are chiefly reproductions of well-known examples of armour, with some fine swords and curious early fire-arms.

LACE forms an important part of the collections, as this industry has for years flourished in Ireland, and many designers are trained in the Metropolitan School of Art, and afterwards find employment in this country. It is essential, if a high standard is to be maintained in beauty of design and workmanship, that the designers and students should constantly study the finest specimens procurable of every variety.

The **EMBROIDERIES** are also valuable as examples of style and workmanship to schools and teachers of needlework.

ENAMELS are not in any great number, but the principal kinds are represented, and in the hope that this beautiful art, which has for some years not been carried on in Ireland, may be re-introduced, it is intended to add to the collection as opportunity occurs.

IRON, BRONZE AND PEWTER.—There are some good examples of ornamental wrought iron, several being from the Peyre collection, and also some good locks and keys, bronze castings of various periods, and some good Pewter.

The **GOLDSMITH'S AND SILVERSMITH'S WORK** comprises a fine assortment of electrotypes, procured by the Science and Art Department, of famous examples, and a small, but interesting collection of Silver, Irish (which held such a very high position in the eighteenth century), English and foreign, with a case of Sheffield plate. To revive and assist this handicraft in Dublin it is intended to add considerably to the number of these examples.

BOOKBINDING is another art which for many years flourished here, and recently many good examples of Irish, English and foreign bindings have been acquired to encourage the craft, and to give ideas to workers.

IVORIES are an interesting part of the collections, and those in Dublin are chiefly reproductions, which are equally useful to Art students.

Photographs of **BUILDINGS** and **ARCHITECTURAL ORNAMENT** are of the greatest use, even to architects who have travelled a good deal, and still more to the many men connected with the profession who seldom or never see the buildings of other countries, and for this reason a collection is being formed to illustrate all the principal styles.

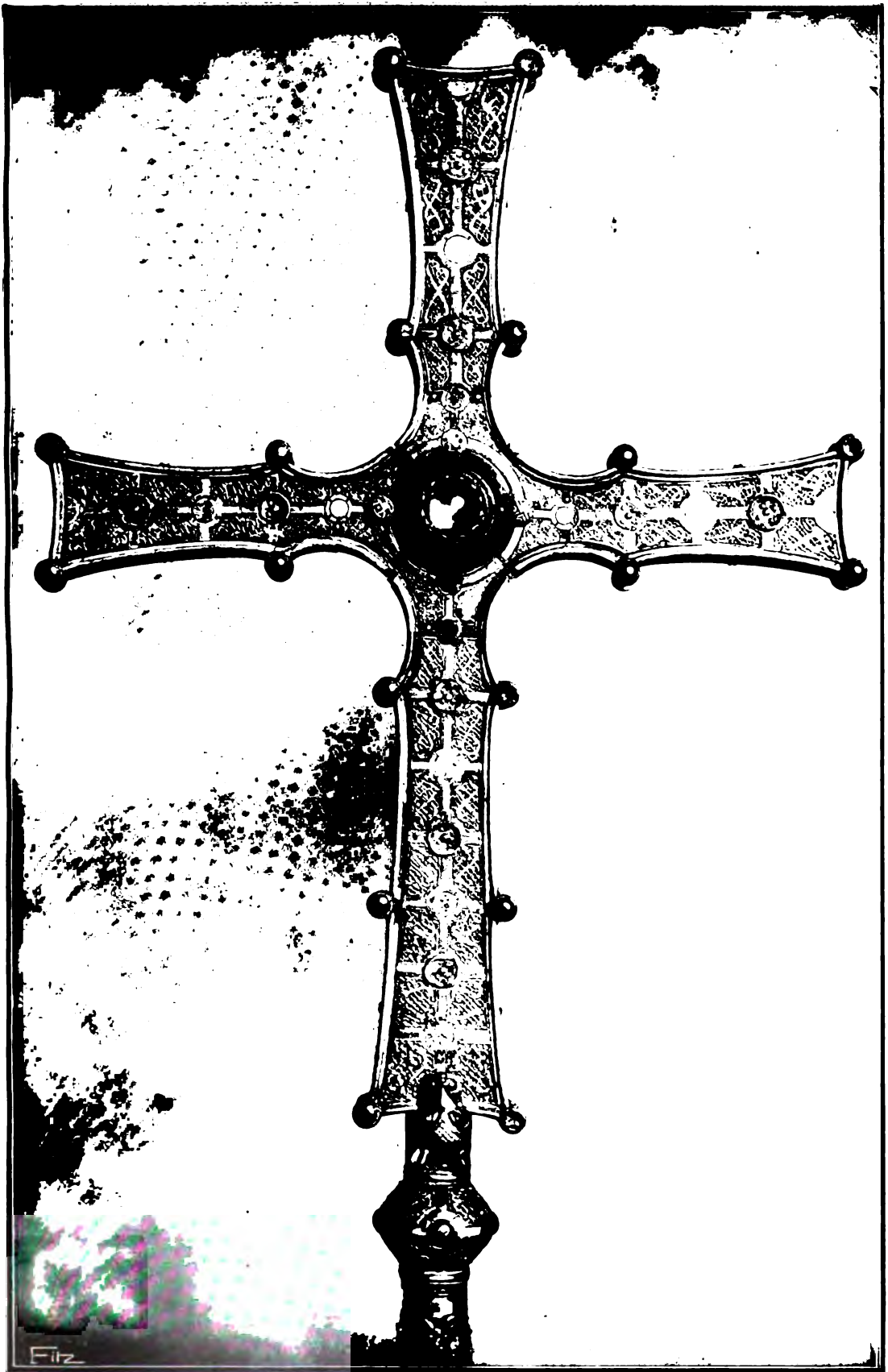
CHINESE ART is represented by some remarkably fine old Cloisonné Enamels, Jade Carvings, and Embroideries.

BURMESE ART is shown by some very fine large decorative tiles and other objects.

Of **JAPANESE ART** the Dublin collection is very good indeed, comprising many examples of the highest quality of lacquer and other works of art; it is necessary to show to the public the very best Japanese work, as most of that produced since the extension of European influence in Japan is so inferior, and it is a school of art which is producing a marked effect upon every European school.

ETHNOGRAPHICAL COLLECTIONS.

The **ETHNOGRAPHICAL COLLECTIONS** are good, the valuable objects lent by Trinity College being such as can no longer be procured. They are being arranged on a special system by which the study of the comparative civilization of the many primitive races of mankind here illustrated is made simple and easy.



The Cross of Cong.

Bronze and Silver; ornaments of gold and gilt bronze, settings of crystal stones and enamel. Made at Roscommon, A.D. 1123, by order of Turlough O'Connor, King of Connaught and Ireland (A.D. 1106-1156), to enshrine a piece of the True Cross presented to him in that year by Pope Calixtus II. Height 2 feet 6 inches, span of arms 1 foot 7 inches.



Shrine of St. Patrick's Bell.

Circa A.D. 1100.

Bronze and Silver; ornaments on front in gold, settings of stones and enamel, settings of crystal of later insertion. Made about A.D. 1090 to enshrine the ancient iron bell, traditionally believed to have belonged to St. Patrick, and preserved at Armagh till 1758. Height 10½ inches, base 6½ inches by 4½ inches.



The Domnach Airgid.
 Book Shrine, formerly belonging to the Abbey of Clones, County Tyrone. It consists of (1) an inner box of yew; (2) a bronze covering plated with silver (11th-12th century);
 (3) an outer case of silver (14th century). Height 7½ inches, length 9 inches, width 4 inches.

IRISH ANTIQUITIES.

The collection of ancient objects illustrating the life of man in Ireland from the earliest times of which any trace of his appearance in this country can be found will bear comparison with the finest similar collections in any country. The relics of the Stone Age are from every part of Ireland, and no pains have been spared to arrange them so as, with the help of full explanatory labels, to show the circumstances under which they were found, and the knowledge of the customs of those early times which may be derived from them.

The Bronze Age room shows a most interesting series of implements in Bronze, and a few in Copper, and is remarkable for the magnificent display of Gold ornaments which, although they are doubtless but a very small proportion of the objects made of this metal at this early period, show in what quantities it existed, and with what skill it was worked at least from early in the Bronze Age till its close. There is also a room devoted to objects, chiefly ecclesiastical, of late medieval times, when the artistic workers of Ireland in Bronze, Gold and Enamels produced such precious objects as the Cross of Cong, the Ardagh Chalice, the Shrine of St. Patrick's Bell, and the Tara Brooch. Illustrations of these beautiful objects will be found on the accompanying plates.

These objects have been collected chiefly by the Royal Irish Academy, and for many years were kept in the Academy's house in Dawson-street; but as it was impossible to exhibit them there in a satisfactory manner, they were transferred, in 1891, to the new Museum building.

ZOOLOGICAL COLLECTIONS.

Though not so extensive as in some of the very large Natural History Museums of Europe, it is believed that these will compare favourably with any in point of arrangement. The ground floor is divided into three sections: the first is arranged to illustrate the history or evolution of animal species, classification, variation, natural selection, structure and instinct, development, &c., and also to show the distribution of some typical species in the several regions into which the earth's surface is divided.

The second and third sections contain the Fauna of Ireland, in the one the invertebrate animals, and in the other the vertebrate; the Irish birds are a notable exhibit, and there are many groups of birds with their nests well set up with very faithful reproductions of their natural surroundings; to many visitors this is the most interesting part of the Museum, and it is believed that it does much to awaken and develop a love of natural history in the young. In the upper floor the chief types of the animal kingdom generally are displayed in regular order, and the adjacent annexe contains the fossil animals, a collection peculiarly rich in the various species of flying reptiles.

In a very conspicuous position are exhibited cases of "Injurious Insects," arranged to show their life history and the means which should be adopted for their destruction.

BOTANICAL DIVISION.

This has been greatly developed during the past few years, and it occupies five rooms.

Room I. is the Index Room to help botanical classes; in the wall cases there are specimens, models and diagrams illustrating the classification of the Vegetable Kingdom (recent and fossil), the life-history of the different groups of plants (root, stem, leaf, flower, fruit, germination); botanical terms with definitions of the same; coloured drawings and specimens as types of the chief natural orders.

In the floor cases are collections of dried plants of economic or general interest.

Rooms II. and IV. contain the Economic (Botanical) Collection, the specimens being arranged systematically in their natural orders.

1. Specimens of plants and parts of plants (raw and manufactured) of economic importance, *e.g.*, the varieties of willow rods and other illustrations of the Osier industry, Potato-tubers, Turf, Kelp, Flax, Tea, various kinds of Timber, Fungi causing diseases of plants, &c., &c.

2. Specimens of Fossil Plants.

The Economic Collection will, it is hoped, contain ultimately a complete illustration of:— (1) All Irish industries into which plants largely enter; (2) such plant industries as might with advantage be carried on in Ireland; and (3) food plants and other plants of more general interest.

The collections are for general consultation, and are intended to be of use in the development of the industries of Ireland.

Room III. is the Herbarium. This room contains dried plants, illustrating the flora of different parts of Ireland and Great Britain, and less completely of other parts of the world. The chief object of the Herbarium is to be of use to students interested in Systematic Botany, including Field Botany in Ireland, and to those wishing to consult the collections in connexion with Economic Botany.

The Herbarium contains a small Working Library, Microscopes, &c.

There is also a large collection of named drugs of use to pharmaceutical and medical students.

GEOLOGY AND MINERALOGY.

The general MINERALOGICAL COLLECTIONS are in cases round a map of Ireland raised in relief, and coloured geologically, and there is also a good collection of Irish Minerals arranged according to counties, and of the Irish stones used for ornamental and building purposes.

There is also a collection of Irish Rocks and Fossils gathered and arranged by the Officers of the Geological Survey, with a series of coloured drawings to illustrate Geological phenomena.

INDUSTRIAL COLLECTION.

The MECHANICAL, or, as usually called, INDUSTRIAL, Collection, is at present very small; but it contains a variety of looms and several fine models of factories and manufacturing plants. Great pains have been bestowed on the labelling of the latter, an explanatory label being attached to each principal pipe, retort, furnace, &c., &c., in the model, numbered consecutively, so that by reading the labels in order, the visitor may follow the process of the manufacture illustrated from beginning to end.

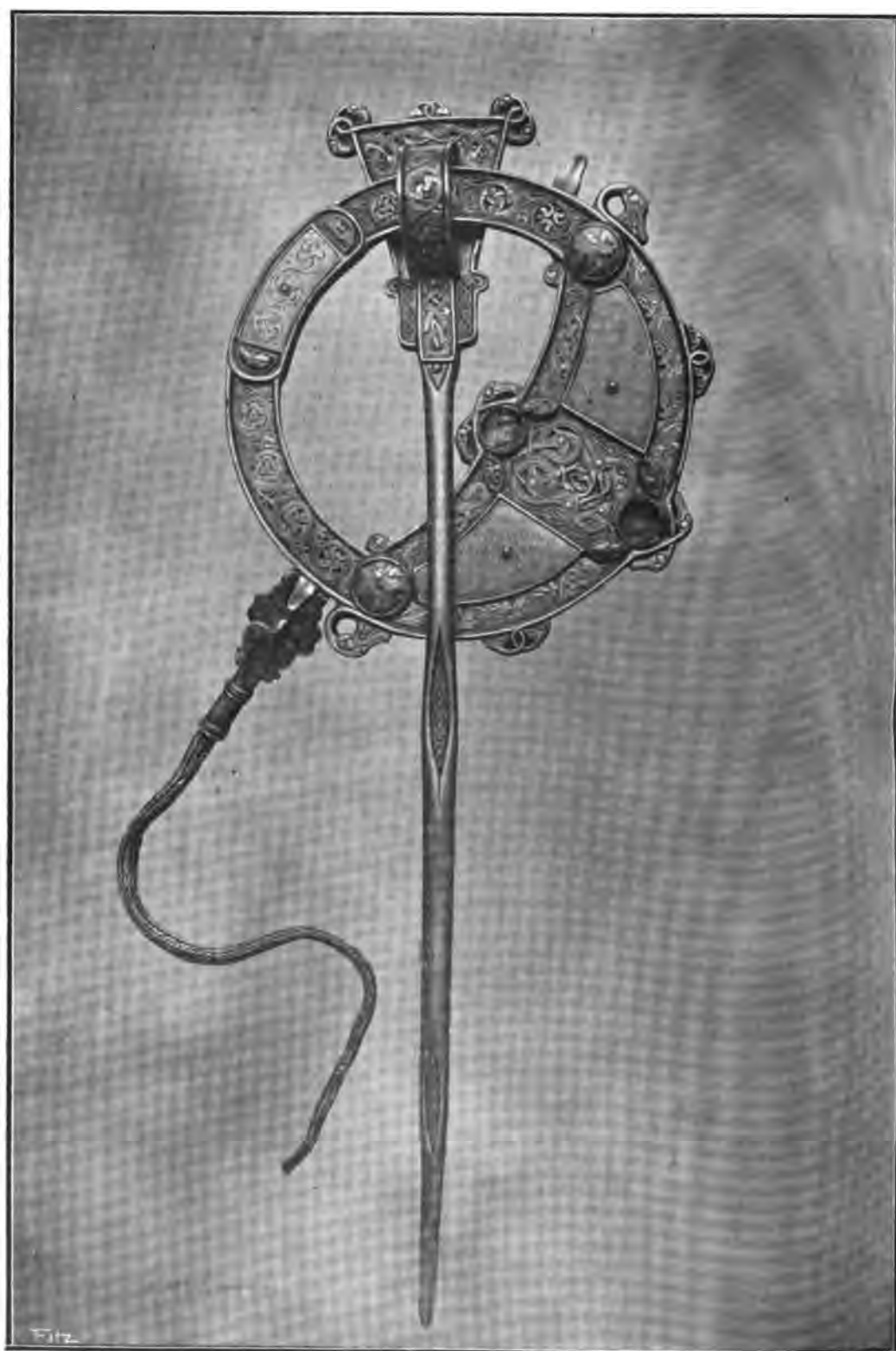
In the matter of GUIDES this Museum may claim to be a pioneer. For one halfpenny can be bought a well-printed pamphlet on good paper, by which the visitor can easily discover where to find any



The Tara Brooch.

Circa, 6th Century.

White Bronze gilt, filagree in gold, settings of amber, glass, and enamel. Length of Pin 9 inches, diameter of Brooch 3 1/2 inches
 Found near Bettystown, Co. Louth. History unknown.



Back of the Tara Brooch.



Ardagh Brooch, Silver Gilt.

One of four Brooches found with the Ardagh Chalice, at Ardagh, Co. Limerick.
 A portion only of the pin is shown in the engraving. This is the largest
 Brooch of this form that has been found in Ireland. Its measurements
 are diameter $5\frac{1}{4}$ inches, length of pin 13 inches.

particular class of objects, and obtain a considerable amount of information concerning many of them.

A General Guide is being brought out in parts and chapters at one penny, each containing a brief general history of the branch of art to which it belongs with references to all the objects in that part of the Collections.

Another special feature in the way of aids to the visitor is the help given in the selection of books bearing upon the arts and sciences which the Collections illustrate. In conspicuous places are hung lists of books in the National Library, which may be useful to visitors to the Museum, arranged for the Art and Antiquities in forty-one classes—Renaissance Art, Gothic Architecture, Jewellery, Fans, Lace, Ethnography, &c., &c.; and there are similar lists for the Botany, Zoology and Mineralogy, and copies of these lists can be bought in pamphlet form for a penny each.

During the winter months there are frequent Demonstrations, or informal Lectures, by members of the Museum staff and others, for which tickets of admission are distributed free of charge, and by these various means it is hoped that many who would otherwise wander among the objects in an aimless and desultory manner may be induced to take a real interest in some branch of industrial art or of natural science, and that the objects for which the public maintain these Collections may thus be better attained.



The Ardagh Chalice.

THE NATIONAL LIBRARY OF IRELAND.

The Royal Dublin Society's Library was taken over by the State in 1877, and re-named the National Library of Ireland. The Library had been explicitly a Public Library, free to respectable persons, introduced by members of the Dublin Society, since 1836, when a Parliamentary Commission on the Society had recommended that its Library should be made the National Library of Ireland. Implicitly the Library had probably been free on the same terms since the beginning of the century, for the Minutes of the Library Committee include references to the constant presence of strangers in the Reading Room; and Stewart's Dublin Almanack of 1820, page 181, under "Dublin Society," has the following entry:—"DEPARTMENTS OPEN TO THE PUBLIC.—*The Library*, on introduction to the librarian."

From 1877 to 1900 the Library was administered by the Department of Science and Art. In 1900 (with the Museum and other Institutions of Science and Art in Dublin) it passed to the administration of the Department of Agriculture and Technical Instruction for Ireland. The Library is under the superintendence of twelve Trustees, of whom eight are re-elected annually by the Royal Dublin Society, while four are appointed by the Lord Lieutenant of Ireland. The sum granted for book-purchase is £1,000 a year. This has been supplemented by a temporary addition, to last five years, of £300 annually. The officials are—a Librarian, A First, and a Second Assistant Librarian, and twelve library-attendants, these last corresponding to the junior library-assistants of the public libraries of England and America.

Though founded in 1877, it was not until 1890 that the Library entered its new building, which is still unfinished. The architect, the late Sir Thomas Deane, formed his plan in constant consultation with Mr. William Archer, F.R.S. The result is a building which, with some faults, is for its size one of the very best in Great Britain and Ireland. Its special points, perhaps, are: the isolation of the large Central Reading Room (shelved to receive a large number of books, which are absolutely free to the public without intervention), and the adoption of the stack system of book-cases in the book-store. A hydraulic lift connects the basement of the book-store with the attic and all intermediary floors.

The books are minutely classified according to subject on the shelves by the so-called Decimal system, invented and developed by Mr. Melvil Dewey, an eminent American Librarian. The essential merit of this classification is that every new book goes to reinforce the books on the same subject already in the Library. A new book on Infinitesimals is so marked that it goes to the place on the shelves where other books on *Infinitesimals* are—not merely to "Mathematics," not merely to "The Calculus." A new life of Cromwell joins other books on *Cromwell*, a new book on Cashmere goes to books on *Cashmere*, not merely Travel, or Asia, or

India; the last book on Free Trade joins older ones on the same subject, and so on. The technique of this is simple, but what will interest non-professional minds is the extraordinary value as an instrument of culture gained for the Library by the juxtaposition in clusters, of books on the same subject. The Decimal system was introduced in the National Library by Mr. William Archer, F.R.S., the Librarian from 1877 to 1895. It has been adopted in several admirable English Libraries—at Manchester, Glasgow, Croydon.

The Library is open from 10 a.m. to 10 p.m. daily, except on Sundays, and on three weekdays at Christmas, four weekdays at Easter, and twelve weekdays in August. The attendances of readers in 1878 numbered 27,452. In 1900, the twenty-third year of the Library, the attendances numbered 148,405. The attendances in 1849 were estimated at over 8,000 per annum. The number of volumes is estimated at 130,000. In 1849 the number was estimated at 19,000. The Library is still the only considerable popular Reference Library in Dublin. The collection of printed books is greater than any other in Ireland (except that of Trinity College, where there are probably more than twice as many). An effort is being made to collect, bind and preserve a considerable number of the newspapers of Ireland, and activity in this, as in many other directions, is conditioned by the desire to make the library match the title it bears, and the responsibilities thus implied. It is the State Library—the tiny British Museum of Ireland.

With the accession of the Joly Collection the Library will be very rich in books on Irish topography, history and biography. From its connection with the Museum of Science and Art, and the Metropolitan School of Art, acquisitions in Botany, Zoology, the Fine Arts and Archæology have always been frequent. There are very few novels on the shelves—practically only the classics of fiction are purchased.

STATISTICAL SURVEY OF IRISH AGRICULTURE IN 1900.

The total area of Ireland—according to the figures supplied by the Director-General of the Ordnance Survey to the Census Commissioners in 1891—was 20,327,947 statute acres. The inclusion of 5,397 acres of reclaimed slob in the Co. Wexford brings the total area to 20,333,344 statute acres. This total—which is that taken in these returns since 1891—includes 129,681 acres under water, but excludes close on half-a-million acres (492,252 is the exact number) under the larger rivers, lakes, and tideways. The following statement shows the distribution of this area in 1900:—

—	1899.	1900.	Increase or Decrease between 1899 and 1900.	
			Increase.	Decrease.
Under Crops, including "Clover, Sainfoin, and Grasses for Hay,"	3,132,801	3,100,397	—	32,404
Under Grass, including temporary pas- ture, and Hay mown on permanent pasture,	12,069,756	12,121,707	51,951	—
Under small Fruit and Fallow. ...	13,086	12,589	—	497
Under Woods and Plantations,	306,495	311,648	5,153	—
Under Bog, Waste, Barren Mountain, Water, and Marsh,	4,809,306	4,787,003	—	22,303
	20,333,344	20,333,344	—	—

"Hay mown on permanent pasture" and "temporary grasses" when grazed are in the above Table put in the category of "Grass" (though technically, of course, as being under rotation, the latter is a "crop"). The idea is to divide off as far as possible arable land from pasture; to distinguish, in other words, land under the plough from land directly given over to stock-raising, or, as it may be called, pastoral land. The division as here given is not quite perfect for the reason just alluded to, that "temporary pastures" would strictly come under the term arable land, but in view of the fact that such lands are often not broken up in many parts of Ireland for three, five, or even ten years, during which time a large percentage of them are grazed, the object of the classification adopted is apparent.

Changes in the use to which the land of a country is put affect its whole social organisation, and of no change can this be said with more truth than of the transfer of land from tillage to pasture. Hence it is important to adopt a classification which throws into bold relief the characteristic features of our rural economy. According to the estimates in the above statement it would appear that 32,404 acres of land went from under the plough in 1900, as compared with the preceding year, while as many as 51,951 acres seem to have been added to the area under grass. These figures imply

that a net addition was made to the cultivated land of the country of 19,547 statute acres in the year 1900. It is, however, possible that the recorded decline of 22,203 acres in "Bog, Waste, Barren Mountain," is, in part, due to a not unnatural divergence of opinion amongst the Enumerators in the different years as to what kind of land exactly should be described as "Barren Mountain." A tract of mountain-side which carried a few score sheep in one year may not happen to be grazed at the time of enumeration in a succeeding season, with the result that it is entered on the statistical forms in a different column on each occasion. Such indeterminate grazing areas are, doubtless, a source of error in comparative classification; but every effort is made by carefully-worded instructions, by queries to the Enumerators for purposes of verification, and in other ways, to minimise the possibilities of serious error. Moreover, errors of classification of the kind referred to would probably tend to correct each other when a long series of years is taken into consideration.*

Adverting to the contraction of the arable land of the country—this is, of course, the outstanding feature of these returns, especially when the process is regarded, not from year to year, but as an historical tendency. The tendency is not, however, confined to Ireland alone of the countries of the United Kingdom, though nowhere is its extent so striking. The arable land of Great Britain

* With reference to the question whether waste land is increasing or decreasing in Ireland, the following from Part I. of Dr. Grimshaw's "Facts and Figures about Ireland" (Hodges, Figgis & Co., Limited, Dublin, 1893), may be of interest. On the showing of these figures (to which I have added those for 1900), it would seem that a very large amount of waste land has been reclaimed during the past sixty years.

DIVISION OF LAND IN 1841, '51, '61, '71, '81, '91, AND 1900.

Division of Land.	1841.	1851.	1861.	1871.	1881.
	Statute Acres.	Statute Acres.	Statute Acres.	Statute Acres.	Statute Acres.
Under Crops (including Meadow).	13,464,300	5,858,951	5,890,536	5,621,437	5,195,375
Under Grass,		8,748,577	9,533,539	10,071,285	10,075,424
Woods and Plantations,	374,482	304,906	316,597	324,990	328,703
Barren Mountain Land,	6,499,971	5,416,319	4,588,091	4,311,041	2,117,672
Bog and Marsh,					1,730,026
Waste Land, &c.,					891,553
Total,				20,328,753	4,729,251
Division of Land.	1891.		1900.		
	Statute Acres.		Statute Acres.		
Under Crops (including Meadow),	4,818,381		4,658,732		
" Grass,	10,298,654		10,563,372		
Woods and Plantations,	311,554		311,648		
Barren Mountain Land,	2,211,341		2,232,753		
Bog and Marsh,	1,743,923		1,577,991		
Waste Land, &c.,	949,491		968,848		
Total,			20,333,344†		4,799,592

NOTE.—The information for 1841 and 1851, respectively, has been obtained from the Census Reports for those years; and that for the subsequent periods from the Agricultural Statistics.

† The difference between the total area entered for 1891 and 1900 and that given for the other years is owing to the adoption in 1891 of revised areas for some counties, and the inclusion of some slob lands in the County of Wexford.

in the year 1899, for example, was the smallest on record. Since 1872—with four checks in 1875, 1885, 1894, and 1897—the extent of land under the plough in Great Britain has continuously declined. The following statement illustrates the relative position of the countries of the United Kingdom as regards the distribution of the several areas between arable and pastoral cultivation:—

Proportion of Arable and Pastoral Lands in each Country of the United Kingdom.

—	England, (Average 1897-99.)	Wales, (Average 1897-99.)	Scotland, (Average 1897-99.)	Ireland, 1899.	United Kingdom.
Arable Lands,	11,506,000	903,000	3,508,000	3,146,000*	19,063,000
Pastoral Lands,	13,257,000	1,925,000	1,386,000	12,070,000	28,638,000
Total Cultivated Lands, ...	24,763,000	2,828,000	4,894,000	15,216,000	47,701,000
Arable %	46·5	31·9	71·7	20·7	40·0
Pastoral %	53·5	68·1	28·3	79·3	60·0

* Including 13,086 acres "under Small Fruit and Fallow" shown separately in preceding table.

More than half of the cultivated area of England is, it will be seen, no longer under the plough. In Ireland the proportion of pastoral to arable lands is 79·3 to 20·7 per cent.; in Scotland the proportion is 28·3 to 71·7 per 100 statute acres of cultivated land. I shall revert further on to the significance of the very large amount of tillage in Scotland. The geographical characteristics of Wales explain to a large degree the very high percentage of her pasture lands, which enable her to produce close on 100 sheep more per 1,000 acres of total area than the joint flocks of Ireland and Scotland for the same area.

It is noteworthy, to introduce a comparison with a foreign country, that, while the area under meadows and pasture in Ireland is over eleven times the similar area in Belgium, our herds of cattle number only slightly over three times as many as those of that country. No doubt, it is generally recognised that with a system of small farming, such as is carried on in Belgium, more cattle can be raised to the acre by means of tillage and house-feeding than on the grazing system; but the fact just mentioned points to the conclusion that pastoral farming—which means, so far as Ireland is concerned, the production of meat, dairy products, and wool—great as its expansion has been, has not, so far, developed at the rate at which the agricultural resources of the country have been passing under its control. One obvious feature—in part a cause and in part an effect—of the continued contraction of the arable land of a country is a great displacement of population. The exodus from the rural districts to the manufacturing districts of England and the annual drain of emigration from this country are striking evidences of the diverse operations of this tendency as it affects, on the one hand, a country with great manufacturing resources, and, on the other, a country whose main industry is agriculture. The remarkable growth of such commercial centres as Belfast and Londonderry affords some proof that where manufacturing industry flourished in Ireland the rural exodus took, to some extent, the same form as it has done in Great Britain—to wit, immigration rather than emigration.

MAP to 11
year 1900 in eac

N.B.—“Arab
under rotation. “F
mown for Hay or C
which are “not for

Arab
Pasto

CONNAUGHT.



The diagram of squares here given illustrates, graphically, the growth of pasture and the shrinkage of crop areas in the years 1880 and 1900 as compared with 1860.

The following Table forms the basis of this diagram :—

YEAR.	Total Area.	" Cultivated Area " (Crops and Grass.)	Crops (other than Meadow and Clover.)	Meadow and Clover.	Grass.
1860,	20,284,893	15,453,773	4,375,621	1,594,518	9,483,634
1880,	20,327,764	15,310,192	3,171,259	1,909,825	10,256,108
1900,	20,333,344	15,222,104	2,493,017	2,165,715	10,563,372

I have further prepared a map showing for each county and province of Ireland and for the whole country the proportion of the cultivated area given up to arable and pastoral uses, respectively, in the year 1900. The figures on which the coloured squares in this map are based are as follows :—

TABLE showing the Number of Statute Acres devoted to ARABLE and PASTORAL uses in each COUNTY and PROVINCE of Ireland and for the whole Country (see MAP).

COUNTIES.	Arable (Statute Acres).	Pastoral (Statute Acres).	COUNTIES.	Arable (Statute Acres).	Pastoral (Statute Acres).
Antrim.	175,603	327,545	Wex.	37,486	327,545
Armagh.	111,519	341,967	Wick.	172,586	341,967
Carlow.	111,519	277,168	Wick.	50,845	277,168
Cavan.	111,519	3,187,457	Wick.	829,744	3,187,457
Down.	111,519	577,033	Wick.	47,337	577,033
Fermanagh.	111,519	1,103,105	Wick.	283,882	1,103,105
London.	111,519	621,127	Wick.	67,450	621,127
Monaghan.	111,519	543,606	Wick.	1,032	543,606
Tyrone.	111,519	727,299	Wick.	254,852	727,299
Total of U.L.	111,519	254,852			
Carlow.	111,519	27,022			
Dublin.	111,519	128			
Kildare.	111,519				
Kilkenny.	111,519				
King's.	111,519				
Longford.	111,519				
Louth.	111,519				
Meath.	111,519				
Queen's.	111,519				

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TABLE showing the Number of Statute Acres devoted to ARABLE and PASTORAL uses in each COUNTY and PROVINCE of Ireland and for the whole Country (see MAP).

COUNTIES.	Arable (Statute Acres).	Pastoral (Statute Acres).	COUNTIES.	Arable (Statute Acres).	Pastoral (Statute Acres).
Antrim,	175,663	399,772	Westmeath,	37,486	327,515
Armagh,	111,519	161,874	Wexford,	172,586	311,967
Cavan,	77,346	316,150	Wicklow,	50,815	277,168
Donegal,	174,280	469,416	Total of LEINSTER,	829,744	3,187,457
Down,	215,251	272,728			
Fermanagh,	39,771	308,090	Clare,	47,337	577,033
Londonderry,	159,725	236,207	Cork,	283,882	1,103,105
Monaghan,	98,468	183,955	Kerry,	67,450	621,127
Tyrone,	197,043	371,163	Limerick,	43,952	513,006
Total of ULSTER, ...	1,279,063	2,719,325	Tipperary,	142,928	727,299
			Waterford,	67,629	254,862
Carlow,	53,266	140,869	Total of MUNSTER,	653,178	3,827,022
Dublin,	35,656	155,630			
Kildare,	61,652	297,266	Galway,	112,827	839,426
Kilkenny,	100,122	353,115	Leitrim,	25,653	267,683
King's,	72,059	276,416	Mayo,	107,403	584,640
Longford,	28,995	174,385	Roscommon,	52,248	426,248
Louth,	73,088	98,704	Sligo,	40,276	269,966
Meath,	50,142	479,507	Total for CONNAUGHT,	338,407	2,387,908
Queen's,	90,817	284,855	Grand Total for IRELAND, ...	3,100,397	12,121,707

YEAR.	Oats.	Meadow.	Wheat.	Barley.	Flax.	Potatoes.	Turnips.	Mangr Waresl and Beet Root.	Total.	
1856,	Acres. 2,118,868	Acres. 1,314,807	Acres. 445,775	Acres. 226,629	Acres. 97,075	Acres. 982,301	Acres. 366,963	Acres. 22,567	Acres. 5,574,966	
1860,	1,966,304	1,594,518	466,415	181,099	128,596	1,172,079	318,540	32,124	5,869,674	
1870,	1,650,039	1,773,851	259,846	241,285	194,910	1,043,683	339,069	25,400	5,527,973	
1880,	1,381,928	1,909,826	143,708	218,016	157,540	820,651	302,696	41,515	4,980,878	
1890,	1,221,013	2,093,634	92,341	182,068	96,896	790,801	296,386	46,457	4,808,686	
1900,	1,106,060	2,166,715	53,821	173,996	47,451	664,079	297,869	68,803	4,666,774	
1900 compared with 1856.	{ Increase or Decrease. }	De- crease. 1,013,808	In- crease. 860,908	De- crease. 391,864	De- crease. 52,633	De- crease. 49,624	De- crease. 328,222	De- crease. 69,094	In- crease. 46,236	De- crease. 1,008,191
	{ Rate per cent. }	47.8	64.7	87.9	23.2	51.1	33.4	18.8	204.9	18.1

Diagram to show the change of the years



- I. The outer square
- II. The coloured square
- III. The uncoloured square Land, Bogs, &c.
("Uncultivated")

IV.  Green

V.  Cro

VI.  Me

AND TECHNICAL INSTRUCTION FOR IRELAND,
AND INTELLIGENCE BRANCH.

Restricting our survey to recent years, we find that the area under crops, including meadow and clover, in 1890 was 4,919,726, while in 1900 it was only 4,658,732—a decrease of 5·3 per cent. in the eleven years. Taking 100 statute acres of arable land as the unit, we find that there were in each such area the following percentages devoted to the several varieties of crops:—

—	Cereals.	Green Crops.	Flax.	Mixed Clover.
1890,	30·8	24·7	2·0	42·5
1891,	31·0	24·7	1·6	42·7
1892,	30·6	24·1	1·4	43·9
1893,	30·5	23·7	1·4	44·4
1894,	30·1	23·6	2·0	44·3
1895,	29·5	23·6	1·9	45·0
1896,	29·3	23·7	1·5	45·5
1897,	29·7	23·5	·9	45·9
1898,	29·6	23·5	·7	46·2
1899,	29·6	23·8	·8	45·8
1900,	28·9	23·6	1·0	46·5
Net Changes, ...	- 1·9	- 1·1	- 1·0	+ 4·0

Comparing the year 1900 with 1899 in regard to the area under cereals and green crops, we find the following results:—

CEREALS—1900 compared with 1899.				
Barley,	...	...	...	+4,527
Wheat	..	...	...	+1,955
Oats.	...	...	...	-30,486
Bere and Rye,	...	...	...	-733
Beans and Pease,	...	...	...	+323
Net decrease of Cereals in 1900, 24,419 Acres.				

GREEN CROPS—1900 compared with 1899.				
Potatoes,	...	...	...	-8,835
Turnips,	...	...	...	-3,560
Vetches and Rape,	..	...	...	-365
Mangel Wurzel and Beet,	...	...	...	+6,089
Cabbage,	...	...	...	+1,212
"Other Green Crops,"	...	...	...	+1,825
Net decrease of Green Crops in 1900, 3,664 Acres.				

Some noticeable features in these Tables are the increase in the area under barley; the sharp decrease in that under oats (which has fallen continuously from 1,254,837 acres in 1894 to 1,105,050 acres in 1900); and the considerable shrinkage in the area under potatoes. The present year is the twelfth in succession in which the acreage under potatoes has decreased. In 1888 it stood at 804,566; in 1900 it is 654,079—a decline of 150,487 acres in twelve years.

The decline in the area under turnips is also worthy of attention, as is the increasing popularity amongst Irish farmers of mangel wurzel. Turnips and swedes have apparently been found a precarious and, therefore, an expensive crop, both in Ireland and Great Britain, if we may judge from the shrinkage in the areas under this class of roots. Mangel wurzel is hardier, and has, so far, proved less liable to disease, and more and more attention is being devoted to its cultivation in this country.

Our industrial fibre crop, flax, shows, in 1900 as compared with 1899, an increase of 12,462 acres, or 35·6 per cent. As usual, the cultivation of flax was almost entirely confined to Ulster, the area covered by the crop being 46,929 acres; in Leinster the extent was only 99 acres; in Munster, 99 acres; and in Connaught, 324 acres, to which amount the County Mayo contributed 293 acres. In regard to our chief cereals, the cultivation of both barley and wheat—though more evenly distributed than flax—is still considerably localized; while the culture of oats, on the other hand, is like that of potatoes, spread over almost every district of the country.

(a) BARLEY.

Though there were only two counties in Ireland—Leitrim and Longford—in which barley was not grown in 1900, still, as has just been said, its culture on anything like a large scale was confined to eight counties. The province of Leinster had under barley 72 per cent. of the total area under that crop in 1900, while Munster had 23 per cent. Ulster and Connaught had, respectively, 3 and 2 per cent. of the total barley area. I append a list of the counties in which an area of 1,000 acres or upwards was under barley last year:—Wexford, 34,000; Kilkenny and Queen's County, 20,000 each; Tipperary, 19,000; Cork, 18,000; King's County, 15,000; Louth, 15,000; Kildare, 12,000; Carlow, 5,500; Galway, 1,900; Dublin, 1,800; Waterford, 1,700; Kerry, 1,600; Down, 1,200; Londonderry, 1,000.

The following statement affords an estimate of the total production of barley in Ireland:—

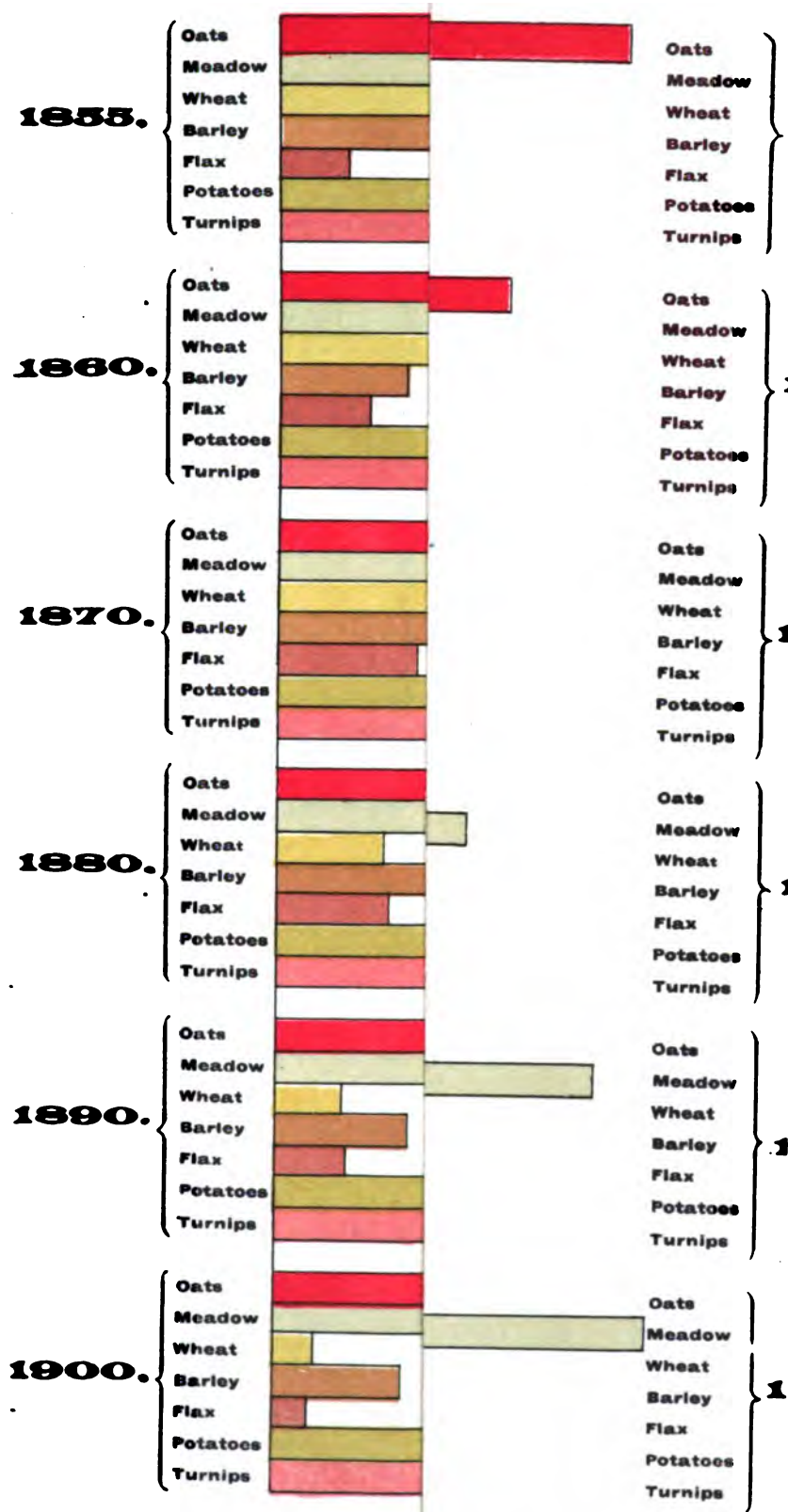
Year.	Statute Acres.	Yield. (Owta.)
Average, 1888-97,	174,000	2,935,000
" 1898,	158,000	2,980,000
" 1899,	169,000	3,010,000
" 1900,	174,000	2,779,000

The area under barley last year was the highest since 1892, when the area under that crop was over 175,000 acres. The imports of foreign barley into the United Kingdom amount to between six and seven times the total Irish produce.

(b) WHEAT.

While Ireland produces between one-third and one-fourth of the oats grown in the United Kingdom, her proportion of barley is less than one-twelfth, and of wheat only about a thirty-fifth part. Down is the great wheat-growing district of Ireland, nearly one-fifth of the total area under the crop being in that county. Cork, Wexford, Galway, Dublin, Tipperary, Limerick, and Kilkenny are, in the order given, the next greatest wheat-growing districts. Taking provinces as the unit, we find that, out of a total area under wheat in 1900 of 53,821 acres, Ulster contributed 17,535 acres (Down alone had 9,531 acres of wheat); Munster, 15,529 acres; Leinster, 14,782 acres; and Connaught, 5,975 acres.

Diagram to illustrate the Land Meadow in each of



The importance of the potato crop in Ireland is not so paramount as it was three or four decades ago, but the potato still forms the staple food of a large proportion of the poorer population of the South and West and North-west. As already stated, the acreage under potatoes in Ireland in 1900 was 654,079, as compared with 662,914 in the year 1899, showing a decrease of 8,835 acres. Of the acreage under potatoes in 1900, 66·1 per cent. consisted of "Champions," leaving only 33·9 per cent. for all other varieties. Since the year 1891, however, the proportion under "Champions" shows a gradual decline from 79·7 per cent. in that year to 66·1 per cent. in 1900. Only four times in the past twenty years has the estimated yield of the potato crop been so low as it was in 1900, viz., 2·8 tons per acre. The very considerable yearly fluctuations in the produce of this staple crop is shown in the following tabular statement:—

Years.	Tons.	Years.	Tons.	Years.	Tons.
1881,	40	1888,	31	1895,	49
1882,	24	1889,	36	1896,	38
1883,	43	1890,	23	1897,	22
1884,	38	1891,	40	1898,	44
1885,	40	1892,	35	1899,	42
1886,	33	1893,	42	1900,	28
1887,	45	1894,	26	Mean,	3·6

As a general basis for calculating the average annual value of Irish crops, the following table, prepared by Sir Robert Giffen for the Financial Relations Commission, affords a careful estimate:—

QUANTITY AND VALUE OF IRISH CROPS (1889-1893).

CROP.	Average Annual Produce.	Average Price Assumed.	Annual Value of Crops.
	Thousand Cwt.	Per Cwt. s. d.	Thousand £.
Wheat,	1,261	7 0	443
Oats,	18,345	6 6	5,962
Barley,	3,051	7 0	1,088
Bere and Rye,	184	6 6	59
Beans and Pease,	87	6 6	29
Flax,	314	55 0	864
	Thousand Tons.	Per Ton. s. d.	
Potatoes,	2,669	60 0	8,007
Turnips,	4,287	12 0	2,572
Mangold,	722	15 0	542
Hay,	4,555	58 0	13,210
Total Estimated Value of the Crops, ...			32,756

The estimates as to the rates of produce of the crops are necessarily open to more objection on the grounds of strict accuracy than statistics, for example, as to the areas under crops. The yield of the crops depends not only on the character of the soil and the degree of intensiveness of the cultivation, but

also upon climatic and seasonal influences, and consequently it is the resultant of many variants. Hence, no absolutely trustworthy produce figures can be obtained over a large area without such an expenditure of labour and money as the results, when attained, would hardly justify. At the same time, I see no reason to doubt the substantial truth of the produce statistics here given, for, as already stated, they are obtained by the Enumerators from practical farmers and other persons qualified to form an opinion on the subject, and there seems to be no solid ground for attributing any bias, either in the way of exaggerating or underestimating the yield of their crops, to those who kindly supply the Enumerators with the returns.

Comparing the produce of the cereal crops in 1900 with the produce in 1899, we find a decrease in wheat of 26,228 cwts., or 2·8 per cent.; in oats, of 384,301 cwts., or 2·1 per cent.; in barley, of 260,716 cwts., or 8·6 per cent.; in bere, of 589 cwts., or 19·1 per cent.; in rye, of 9,193 cwts., or 5·9 per cent.; in beans, of 1,838 cwts., or 4·0 per cent.; with an increase in pease of 485 cwts., or 8·9 per cent. In green crops, potatoes show a decrease of 918,455 tons, or 33·3 per cent.; turnips, an increase of 117,374 tons, or 2·7 per cent.; mangel wurzel and beet-root, an increase of 120,621 tons, or 11·3 per cent.; and cabbage, an increase of 54,054 tons, or 13·7 per cent. Flax shows an increase of 483,620 stones of 14 lbs., or 42·2 per cent. (following an increase of 69,404 stones, or 6·5 per cent., in 1899; a decrease of 87,707 stones, or 7·5 per cent., in 1898 as compared with 1897; a decrease of 483,213 stones, or 29·3 per cent., in 1897 as compared with 1896; a decrease of 304,173 stones, or 15·6 per cent., in 1896, as compared with 1895; a decrease of 1,490,281 stones, or 43·3 per cent., in 1895, as compared with 1894; and an increase of 980,112 stones, or 39·8 per cent., in 1894, as compared with 1893); hay from clover, sainfoin, and grasses under rotation, an increase of 3,667 tons, or 0·3 per cent.; and hay from permanent pasture or grass not broken up in rotation, an increase of 334,506 tons, or 9·5 per cent.; the entire hay crop showing an increase of 338,173 tons, or 6·9 per cent.

The yield per acre of cereal crops in 1900, compared with that of 1899, shows a decrease in wheat from 17·9 cwts. to 16·7 cwts.; and in barley, from 18·0 cwts. to 16·0 cwts.; in bere, from 14·8 cwts. to 14·1 cwts.; in rye, from 12·9 cwts. to 12·8 cwts.; in beans, from 22·8 cwts. to 19·0 cwts.; oats gave the same yield (15·8 cwts.) in both years; while there was an increase in pease from 12·8 cwts. to 13·5 cwts. In other crops—potatoes show a decrease from 4·2 tons to 2·8 tons; turnips, an increase from 14·3 tons to 14·9 tons; mangel wurzel and beet-root, from 17·0 tons to 17·2 tons; and cabbage, from 9·4 tons to 10·4 tons. Hay from clover, sainfoin, and grasses under rotation shows the same rate of yield (2·2 tons) for 1900 as for 1899; and the yield of hay from permanent pasture or grass not broken up in rotation, an increase from 2·4 tons to 2·5 tons. The yield per acre of flax was 34·3 stones, against 32·7 stones in 1899, 31·2 stones in 1898, 25·6 stones in 1897, 22·8 stones in 1896, and 20·5 stones in 1895, when the yield was lower than in any year since 1871, with the exception of 1877.

STATEMENT showing the estimated total produce and yield per acre of the principal Cereals in the year 1900, with comparative statements for the year 1899, and for the average of the Ten years 1890-99, for the United Kingdom, and for each country separately. The figures for England, Wales, Scotland, and Great Britain, have been supplied by the Board of Agriculture of England.

WHEAT.

	Estimated Total Produce.		Acreage.		Estimated Yield per Acre.		Average of the Ten Years 1890-99.
	1899.	1900.	1899.	1900.	1899.	1900.	
England	Bush. 62,380,067	Bush. 49,528,385	Acres. 1,899,827	Acres. 1,744,556	Bush. 32'83	Bush. 28'39	Bush. 30'15
Wales	1,380,938	1,332,299	53,898	51,654	25'62	25'79	24'15
Scotland	1,768,320	1,779,125	47,256	48,832	37'42	36'43	36'98
Great Britain ...	65,529,325	52,639,809	2,000,981	1,854,042	32'75	28'53	30'15
Ireland,	1,731,244	1,682,284	51,866	53,821	33'38	31'26	30'91
United Kingdom	67,260,569	54,322,093	2,052,847	1,908,863	32'08	28'51	30'27

BARLEY.

	Estimated Total Produce.		Acreage.		Estimated Yield per Acre.		Average of the Ten Years 1890-99.
	1899.	1900.	1899.	1900.	1899.	1900.	
England	Bush. 56,164,313	Bush. 60,977,265	Acres. 1,636,634	Acres. 1,645,022	Bush. 34'34	Bush. 30'99	Bush. 33'44
Wales	3,328,494	3,341,872	105,978	105,048	31'41	31'81	30'10
Scotland	8,222,891	7,995,373	240,496	240,195	34'19	33'29	36'20
Great Britain, ...	67,715,698	62,314,510	1,982,108	1,990,265	34'16	31'31	33'50
Ireland,	6,809,786	6,225,782	169,469	173,966	40'18	35'78	38'51
United Kingdom	74,525,484	68,540,292	2,151,577	2,164,261	34'54	31'67	33'86

OATS.

	Estimated Total Produce.		Acreage.		Estimated Yield per Acre.		Average of the Ten Years 1890-99.
	1899.	1900.	1899.	1900.	1899.	1900.	
England,	Bush. 73,905,288	Bush. 73,604,178	Acres. 1,781,649	Acres. 1,860,513	Bush. 41'48	Bush. 39'56	Bush. 40'80
Wales,	7,537,953	7,238,305	220,233	216,447	34'18	33'44	33'20
Scotland,	33,313,304	34,005,054	957,873	949,128	34'78	35'83	36'55
Great Britain, ...	114,746,544	114,847,537	2,959,755	3,026,088	38'77	37'95	38'81
Ireland,	51,393,296	50,289,663	1,135,536	1,105,050	45'26	45'51	43'24
United Kingdom,	166,139,840	165,137,200	4,095,291	4,131,138	40'57	39'97	40'04

The above estimates redound to the credit of our Irish farmers, as well as emphasize the natural richness of certain districts of

Ireland for grain raising. In considering their significance regard must be had to the comparatively small areas under wheat and barley. It will be noticed that Scotch farmers, with a still smaller area under wheat, succeed in raising, on an average, fully 6 bushels per acre more than is raised in Ireland; while in the case of barley, of which cereal 66,000 more acres were grown last year in Scotland than in Ireland, the estimated yield per acre for this country was but $2\frac{1}{2}$ bushels more than that recorded for Scotland. It is probable, again, that there is no soil in the United Kingdom more suitable for growing good barley crops than certain districts of the County Wexford, the Cloyne district of County Cork, and portions of Lower Ormond, in North Tipperary.

As illustrating the difference of gross yield in the "extensive" farming of a new country as distinguished from "intensive" culture, the following statement showing the estimated yield of the chief cereals in bushels per acre for the United States, the United Kingdom, and Ireland in the year 1897 is of interest:—

Average Yield per Acre (Bushels), 1897.

—	United States.	United Kingdom.	Ireland.
Wheat.	130	291	287
Barley.	238	329	340
Oats,	260	388	398

In regard to green crops, while Ireland more than holds her own in the case of turnip production, the estimate of the yield of the potato crop in this country is remarkably lower than that of England. It must be remembered, however, that the area under potatoes in Ireland is, on an average, between three and four hundred thousand acres more than the same area in England.

Estimated Yield per Acre (Tons) of certain Crops.

Average for Ten Years 1889–1898.

Crops.	England.	Wales.	Scotland.	Great Britain.	Ireland.	United Kingdom.
Potatoes,	605	575	574	595	357	458
Turnips,	1269	1513	1526	1343	1453	1359

According to the returns for 1900, the number of separate holdings was 586,717, being 2,432 more than in the previous year. The holdings which decreased in number were those "above 1 and not exceeding 5 acres" by 121; those "above 5 and not exceeding 15 acres" by 89; and those "above 15 and not exceeding 30 acres" by 153. The holdings which increased in number were those "not exceeding 1 acre" by 2,628; those "above 30 acres and not exceeding 50 acres" by 55; those "above 50 and not exceeding 100 acres" by 49; those "above

100 and not exceeding 200 acres " by 28; those " above 200 and not exceeding 500 acres " by 30; those " above 500 acres " by 5.

Size of Holdings.	Number in 1899.	Number in 1900.	Increase or Decrease in 1900.	
			Increase.	Decrease.
Not exceeding 1 Acre,	69,220	71,848	2,628	—
Above 1 and not exceeding 5 Acres,	62,275	62,154	—	121
" 5 " 15 " ...	154,840	154,751	—	89
" 15 " 30 " ...	133,683	133,530	—	153
" 30 " 50 " "	73,994	74,049	55	—
" 50 " 100 " "	57,527	57,576	49	—
" 100 " 200 " ...	23,023	23,061	28	—
" 200 " 500 " ...	8,189	8,219	30	—
Above 500 Acres,	1,534	1,539	5	—
Total,	584,285	586,717	2,432	—

As in many instances landholders occupy more than one farm, and as in other cases farms extend into two or more townlands—the portion in each townland being enumerated and classified as a separate holding—it has been considered desirable, with the view of ascertaining the number of Occupiers, and of classifying them according to the total extent of land held by each, to obtain a return of the number of persons having more than one farm or holding. Each Enumerator is, therefore, required to furnish the name of every landholder residing in his district who has two or more farms, or whose farm extends into two or more townlands, together with the area of each portion and the locality in which it is situated. From the number of actual occupiers thus arrived at, it appears that in 1900 there were 586,717 holdings in the hands of 544,559 occupiers.

The number of separate holdings and the number of occupiers in each province in 1899 and 1900, respectively, were:—

PROVINCES.	Number of Separate Holdings.		Number of Occupiers.	
	1899.	1900.	1899.	1900.
Leinster,	137,875	128,325	117,651	116,104
Munster,	133,199	134,340	121,604	122,780
Ulster,	200,389	201,280	183,742	189,659
Connaught,	122,822	122,772	116,157	116,116
Total,	584,285	586,717	544,554	544,559

The total number of occupiers of land returned in 1900 was 544,559, being 405 more than in the previous year. Excluding those holding land "not exceeding one acre," who are to a great extent merely occupiers of small gardens, the landholders numbered 473,456 in 1900, or 2,198 less than in 1899, the number in Leinster having decreased by 2,208—from 94,247 in 1899 to 92,039 in 1900; in Ulster by 52—from 170,795 in 1899 to 170,743 in 1900; and in Connaught by 22—from 109,668 in 1899 to 109,646 in 1900; but

increased in Munster by 84—from 100,944 in 1899 to 101,028 in 1900. There was a decrease of 2,292 in occupiers holding land above 1 and not exceeding 50 acres, and the number holding land exceeding the latter acreage increased by 94.

The following statement shows the number of occupiers of land in each year from 1894 to 1900 by provinces:—

PROVINCES.	Number of Occupiers in the Year.						
	1894.	1895.	1896.	1897.	1898.	1899.	1900.
Leinster,	110,183	111,573	111,856	112,722	113,687	117,651	116,104
Munster,	116,094	116,758	117,170	117,175	117,974	121,604	122,780
Ulster,	188,305	187,967	188,337	187,963	187,837	188,742	189,569
Connaught, . . .	115,554	115,575	115,680	115,654	115,860	116,157	116,116
IRELAND, . . .	530,136	531,573	533,043	533,514	535,358	544,154	544,569

The number of holdings "above 1 and not exceeding 5 acres" diminished enormously between 1841 and 1900. In Leinster the decrease was 65·2 per cent.; in Munster, 80·1; in Ulster, 79·8; in Connaught, 87·5; and in all Ireland 80·0 per cent. In the same period holdings "above 5 and not exceeding 15 acres" diminished; the decrease in all Ireland was 38·8 per cent. In Leinster the decrease was 45·1 per cent.; in Munster, 68·7; and in Ulster 36·2; while in Connaught, on the other hand, these holdings increased 2·6 per cent. Holdings "above 15 and not exceeding 30 acres" increased 6·1 per cent. in Leinster; 112·6 per cent. in Ulster; and 478·1 per cent. in Connaught; they decreased 12·0 per cent. in Munster. In all Ireland they increased 68·3 per cent. Holdings "above 30 acres" increased 119·5 per cent. in Leinster; 243·6 in Munster; 360·6 in Ulster; 434·5 in Connaught; and 238·2 per cent. in all Ireland. The total number of holdings "above 1 acre" decreased between 1841 and 1900 by 22·8 per cent. in Leinster; 31·4 per cent. in Munster; 23·0 in Ulster; and 25·5 in Connaught.

The question of cultivation on a small and on a large scale has always occupied the attention of economists, and is, beyond doubt, one of great social and economic importance. The difficulties of any international comparisons as to size of holding, are, however, very serious. "That the average size of a farm in France is 12½ acres, while in the United States it is 137, shows simply (it has been well said) that the two systems of agriculture are entirely different—nothing more."* This applies not merely to comparisons between different countries, but also, though probably in a less degree, to comparisons of different periods in the same country. The gradual substitution of pasture for tillage which has marked the last half-century in Ireland was necessarily accompanied by a consolidation of holdings and a proportionate increase in the number of the larger-sized farms. Not many people, perhaps, realize the full extent of this great transformation in rural Ireland. With a view to bringing out its magnitude and significance, I have prepared a table showing the number of each class of holdings above one acre; the percentage of each class to the total of holdings above one acre; and the

* Mayo-Smith—*Statistics and Economics*, 1899, p. 152.

decrease by decades in the number of holdings. It will be seen from this table that, while in 1841 holdings between one and fifteen acres were 81·5 per cent. of the total of holdings above one acre, in 1900 they were but 42 per cent. On the other hand, holdings between fifteen and thirty acres have increased from 11·5 per cent. of the total of holdings above an acre in 1841 to 26·0 in 1900; and those above 30 acres in the same period from 7·0 to 32·0. In the decade 1841-51—the famine decade—the number of holdings above one acre shows the remarkable decline of 120,864, the decrease of those between 1 and 5 acres reaching the extraordinary figure of 222,353. In succeeding decades the decreases are respectively—1,854; 24,342; 17,399; 9,731, and finally 2,143 for the decade 1891 and 1900. Since 1851 there has been a gradual decline in the absolute number of holdings between 15 and 30 acres, though the percentage of this class of holding to the total holdings above an acre has increased from 24·8 per cent. in 1851 to 26·0 in 1900. The holdings above 30 acres, have, on the contrary, continuously increased both absolutely and relatively to the total number of holdings above one acre. In 1851 the number of this class of holding was 149,090, and the percentage to the total holdings above 1 acre 26·1; in 1900 the numbers were 164,434, and the percentage 32·0. The increase of large farms (that is, those above 30 acres) between 1841 and 1900 has been at the following rates per cent. in the different provinces:—Leinster, 119·5 per cent.; Munster, 243·6 per cent.; Ulster, 360·6 per cent.; and Connaught, 434·5 per cent. The following comparative statement is of interest in this connection:—

	1841.	1891.
Persons engaged in Agriculture,	1,844,000	937,000
Farm Labourers, Farm Servants (Males).	1,222,000	258,000
Holdings between One (1) and thirty (30) Acres,	643,000	364,000

The following is the table to which reference is made above:—

TABLE showing the SIZE of FARMS in IRELAND.

—	Number.	Per Cent.	Decrease in No. of Holdings per Decade.
1841.			
Above 1 Acre and not exceeding 5 Acres, ...	310,436	44·9	—
“ 5 Acres “ “ 15 “ ...	252,799	36·6	—
“ 15 “ “ “ 30 “ ...	79,342	11·5	—
“ 30 “ “ “ “ “ ...	49,625	7·0	—
Total 1 Acre and above, ...	691,202	100·0	—
1851.			
Above 1 Acre and not exceeding 5 Acres, ...	88,083	15·5	—
“ 5 Acres “ “ 15 “ ...	191,854	33·6	—
“ 15 “ “ “ 30 “ ...	141,311	24·8	—
“ 30 “ “ “ “ “ ...	149,090	26·1	—
Total 1 Acre and above, ...	570,338	100·0	120,864

TABLE showing the SIZE of FARMS in IRELAND.

—	Number.	Per Cent.	Decrease in No. of Holdings per Decade.
1861.			
Above 1 Acre and not exceeding 5 Acres,	85,469	15.0	—
„ 5 Acres „ „ 15 „	183,931	32.4	—
„ 15 „ „ „ 30 „	141,251	24.9	—
„ 30 „	157,833	27.8	—
Total 1 Acre and above,	568,484	100.0	1,854
1871.			
Above 1 Acre and not exceeding 5 Acres,	74,809	13.7	—
„ 5 Acres „ „ 15 „	171,383	31.5	—
„ 15 „ „ „ 30 „	138,647	25.5	—
„ 30 „	150,303	29.3	—
Total 1 Acre and above,	541,142	100.0	21,312
1881.			
Above 1 Acre and not exceeding 5 Acres,	67,071	12.7	—
„ 5 Acres „ „ 15 „	164,045	31.1	—
„ 15 „ „ „ 30 „	135,793	25.6	—
„ 30 „	159,834	30.4	—
Total 1 Acre and above,	526,743	100.0	17,399
1891.			
Above 1 Acre and not exceeding 5 Acres,	63,464	12.3	—
„ 5 Acres „ „ 15 „	156,661	30.3	—
„ 15 „ „ „ 30 „	133,947	25.9	—
„ 30 „	162,910	31.5	—
Total 1 Acre and above,	517,012	100.0	9,731
1900.			
Above 1 Acre and not exceeding 5 Acres,	62,154	12.0	—
„ 5 Acres „ „ 15 „	154,751	30.0	—
„ 15 „ „ „ 30 „	133,530	26.0	—
„ 30 „	164,434	32.0	—
Total 1 Acre and above,	514,869	100.0	2,143

No statistics, unfortunately, of the relative portions of the area of cultivated land comprised in each of the above group of holdings are available for Ireland. This proportion would have to be taken into consideration before the full significance of the distribution

of farms in this country could be appreciated. The following table, taken from the French *Statistique Agricole*, 1897, brings out the importance of this point, and is of interest in itself. The details given are for the year 1892:—

—	No. of Farms.	Area in Hectares.	Per Cent. of No.	Per Cent. of Area.	Average Size (in Hectares).
Under 1 Hectare (2½ Acres), ...	2,235,405	1,327,300	39·2	2·7	0·59
1 Hectare to 10 (2½-25 Acres), ...	2,617,563	11,244,700	45·9	22·8	4·29
10 to 40 Hectares (25-100 Acres), ...	711,118	14,313,400	12·5	29·0	20·13
Over 40 Hectares (over 100 Acres),	138,671	22,493,400	2·4	45·5	162·21
	5,702,762	49,378,800	100·0	100·0	8·65

This table shows that, while nearly two-fifths of all French farms are below one hectare, or two and a half acres, this class of holding covers only slightly more than two and one half per cent. of the cultivated area of the country. It will further be seen that the most important category of holdings in France seems to be that of farms from one to ten hectares. These farms cover more than one-fifth of the total area under cultivation, and are close on half the total number of holdings. The average farm in France is, it will be noticed, about twenty-two acres; in Great Britain the average farm is sixty-three acres; and in England as much as sixty-five acres. Some interesting results bearing on the size of holdings were brought out by the agricultural statistics of Belgium collected in 1895. From these very full returns it appears that the number of agricultural holdings in Belgium was 572,550 in 1846; in 1866 it had increased to 744,007, or by 30 per cent. From 1866 to 1880 the increase went on by more than 166,000, or 22·4 per cent. But the number of farms, which had increased to 744,007 in 1866, and from that to 910,386 in 1880, falls in 1895 to 829,625, a decrease of nearly 81,000, or 8·8 per cent. On the other hand, the average size of the Belgian farms has increased in recent years. In 1846 the average plot was 4·54 hectares; it fell in 1866 to 3·57 hectares; in 1880 to 2·90 hectares; while in 1895 it rose to 3·14 hectares. It appears further from the official returns of Belgium that, while the number of holdings has been declining since 1880, what may be called the medium farms (five to ten hectares) and large farms (ten to twenty hectares) are increasing, especially the latter. A marked increase in the number of Belgian farms above twenty hectares is also revealed by these statistics, which show generally a significant arrest of that division of property which had gone on in Belgium without interruption till 1880, and a correlative tendency towards the concentration of land in the hands of medium and large proprietors.

An examination of the tables devoted to Live Stock will show that no less than 101,093 cattle were added to our Irish herds in 1900. This forms the highest total—4,608,550—ever recorded for Irish cattle since these agricultural statistics have been first

collected. The increase, it will be seen, has been progressive since 1895. Sheep have also continuously increased since the year just mentioned; the total for 1900—4,386,876—being the highest for seven years. Pigs have, on the other hand, declined very considerably. At the period of the enumeration in 1900, the total number of horses in Ireland was 566,978, being a decrease of 13,308 compared with the number for 1899. There was a decrease of 11,868 in the number "two years old and upwards," of 2,311 in the "one year old and under two," and an increase of 871 in those "under one year." The number of Mules was 30,678, or 549 more than 1899, and the number of Asses 242,247, being an increase of 5,070. Horses, Mules, and Asses taken together numbered 847,592 in 1899, and 839,903 in 1900, being a decrease of 7,689, or 0·9 per cent., in the latter year; compared with the average number for the ten years 1890-99, they show a decrease of 20,216, or 2·4 per cent. As bearing on the relative position of Ireland and other countries in regard to the proportion of her flocks and herds to each 1,000 acres of their total areas, the following table, prepared by Major P. G. Craigie and quoted in a paper read by him as President of the Economic Section of the British Association last year, is of interest:

	Per 1,000 Acres of Total Area.			
	Persons.	Cattle.	Sheep.	Swine.
Ireland, ...	219	217	207	61
Scotland, ...	220	64	390	7
Hungary, ...	232	85	100	92
Denmark, ...	248	186	115	83
France, ...	293	103	164	48
Switzerland, ...	311	132	27	57
Austria, ...	320	117	43	48
Wales, ...	345	147	685	50

On this table Major Craigie commented as follows:—

"Thus Wales bears easily the palm as regards the total stock of sheep carried, while Ireland, with a population practically bearing a similar ratio to that of Scotland to her surface, has more than three times as dense a stock of cattle and more than eight times as many pigs, although not more than half as many sheep, to 1,000 acres. Although beaten as regards the number of pigs maintained in a given area by Denmark and by Hungary, Ireland's cattle are more than twice as numerous, relatively, as those of France, where the population is not so very different in proportion to the soil."

This is certainly satisfactory so far as the Live Stock columns in

the table are concerned. Taking a wider survey of time, but confining the table to Ireland, it will be seen that the decline in population has been as continuous as the increase in cattle.

Per 1,000 Acres of Total Area.

YEAR.	Persons.	Cattle.	Sheep.	Swine.
1851. . .	315	143	102	52
1861. . .	279	167	171	53
1871. . .	260	191	203	78
1881. . .	249	190	166	53
1891. . .	226	214	227	66
Net Changes.	- 89 - 28.3 %	+ 71 - 49.7 %	+ 125 - 122.5 %	+ 14 - 26.9 %

The number of Sheep in 1900 was 4,386,876, being 22,369, or 0.5 per cent., more than the number for the previous year, and 66,422, or 1.5 per cent., more than the average for the ten years 1890-99; the "one year old and upwards" increased by 31,133, or 1.2 per cent., as compared with the number in 1899, while those "under one year" decreased by 8,764, or 0.5 per cent. Pigs were returned as 1,268,521 in 1900, showing a decrease of 94,789, or 6.9 per cent., as compared with the previous year. The "one year old and upwards" decreased by 12,682, or 8.6 per cent., and those "under one year" by 82,107, or 6.8 per cent. Comparing the number of Pigs returned in 1900 with the average for the ten years 1890-99, we find a decrease of 59,580, or 4.5 per cent. The number of Goats in 1900 was 306,078, being 2,569 more than in 1899, and 8,780, or 2.8 per cent., under the average for the ten years 1890-99. Poultry numbered 18,547,307 in 1900, being 313,787 more than in 1899, and 1,956,941, or 11.8 per cent., over the average for the ten years 1890-99. Of the 18,547,307 Poultry in 1900, 1,108,642 were Turkeys; 2,007,719 Geese; 3,027,110 Ducks; and 12,403,836 ordinary Fowl. Compared with 1899, Turkeys decreased by 11,715, Geese decreased by 3,682, Ducks increased by 12,164, and ordinary Fowl increased by 317,020.

The following statement shows the number of Milch Cows in Ireland in each year from 1854—the first year in which Milch Cows were separately enumerated—to 1900. The average number for the first five years of the period was 1,579,851, and for the last five years 1,439,568, being a decline of 140,283, or 8.9 per cent. The highest number in any one year was 1,690,389 in 1859, and the lowest 1,348,886 in 1864. The number for last year was 1,458,074, being 23,323 over the average for the preceding five years, and 14,219 over the number for 1899. The number of Milch Cows enumerated for 1900 was higher than that for any year since 1879.

STATEMENT showing the Number of Milch Cows in Ireland in each year from 1854—the first year in which the Milch Cows were separately enumerated—to 1900, with the Proportion per cent. each year to the Total Cattle enumerated.

Years	No. of Milch Cows.	Proportion per Cent. to Total Cattle enumerated.	Years.	No. of Milch Cows.	Proportion per Cent. to Total Cattle enumerated.
1854, . .	1,517,672	43.4	1878, . .	1,484,315	37.2
1855, . .	1,561,296	43.8	1879, . .	1,464,818	36.0
1856, . .	1,579,529	44.0	1880, . .	1,396,047	35.6
1857, . .	1,605,350	44.3	1881, . .	1,392,012	35.2
1858, . .	1,635,409	44.6	1882, . .	1,399,005	35.1
1859, . .	1,690,389	44.3	1883, . .	1,402,324	34.2
1860, . .	1,628,453	45.1	1884, . .	1,356,585	33.0
1861, . .	1,545,168	44.5	1885, . .	1,417,423	33.5
1862, . .	1,486,835	45.7	1886, . .	1,418,644	33.9
1863, . .	1,396,924	44.4	1887, . .	1,394,135	33.5
1864, . .	1,348,886	41.3	1888, . .	1,384,771	33.8
1865, . .	1,387,448	39.7	1889, . .	1,363,781	33.3
1866, . .	1,482,616	39.6	1890, . .	1,400,527	33.0
1867, . .	1,521,063	41.0	1891, . .	1,442,268	32.4
1868, . .	1,476,339	40.5	1892, . .	1,451,059	32.0
1869, . .	1,506,088	40.3	1893, . .	1,441,329	32.3
1870, . .	1,529,024	40.2	1894, . .	1,447,441	33.0
1871, . .	1,545,662	38.9	1895, . .	1,433,968	32.9
1872, . .	1,561,784	38.2	1896, . .	1,429,795	32.4
1873, . .	1,528,136	36.8	1897, . .	1,434,925	32.1
1874, . .	1,491,375	36.2	1898, . .	1,431,192	31.9
1875, . .	1,530,366	37.2	1899, . .	1,443,865	32.0
1876, . .	1,532,974	37.2	1900, . .	1,458,074	31.6
1877, . .	1,522,811	38.1			

A more accurate idea of the number of Live Stock produced in Ireland is furnished when we take into account the export trade, the extent of which is shown in the subjoined statement:—

Exports of Live Stock from Ireland to Great Britain.

Average of 3 Years.	Cattle.	Sheep.	Pigs.
1854, 5, and 6,	242,280	482,830	241,293
1864, 5, and 6,	331,417	367,486	408,740
1874, 5, and 6,	634,052	783,007	440,423
1884, 5, and 6,	691,234	632,196	425,509
1894, 5, and 6,	766,707	782,328	580,925
Year 1900,	745,519	862,263	715,202

The growth in the export trade between 1855 and 1875 is remarkable, as is also the expansion in the export trade of sheep and pigs in recent years. Another aspect of the extent of the trade is presented in the table that follows:—

TABLE showing the Percentage of Cattle, Sheep, and Swine exported from Ireland to Great Britain to the Total Cattle, Sheep, and Swine enumerated as in Ireland in each of the Years 1890 to 1900.

YEAR.	Percentage of Cattle, Sheep, and Swine Exported to Total Cattle, Sheep, and Swine in Ireland.		
	Cattle.	Sheep.	Swine.
1890,	14.9	14.7	38.4
1891,	14.2	18.9	36.8
1892,	15.8	22.4	45.0
1893,	15.4	25.1	39.6
1894,	18.8	23.3	42.1
1895,	18.2	16.7	40.9
1896,	15.5	18.1	43.5
1897,	16.7	19.3	52.4
1898,	17.9	19.4	47.0
1899,	17.1	20.0	50.5
1900,	16.2	19.7	56.4

A very large proportion of the export trade in cattle is a store cattle trade. In 1900 the proportion of fat cattle to stores was 275,450 of the former to 427,891 of the latter. About 41.0 per cent. of the total stores exported go to Scotland, while as much as 76.9 per cent. of the total cattle shipped to Scotland are store cattle. In fact it would appear from these figures that a large number of Scotch farmers must have given up breeding stock of their own since they find such a supply of young cattle raised on Irish pastures ready to their hand—a fact that would, in a measure, explain the very high percentage of the cultivated land of Scotland which is under the plough. The extensive pasture lands of this country enable the farmers of Great Britain, and especially those of Scotland, to forego, to a great extent, the trouble and expense of raising young stock. The frames of the store cattle exported from Ireland are built up out of our Irish grasslands—the animals being fattened and “finished” in Great Britain. This interesting instance of a territorial division of labour, within the sphere of agriculture, between different countries, affords evidence, for one thing, of the fine bone-producing qualities of the great limestone plains of Ireland. At the same time so great an expansion of the export trade in store cattle as has now taken place involves an exhausting drain on a great natural resource of the country.

were used for "propping," which appears to have been the chief purpose to which the timber of almost all descriptions was applied. The numbers applied to the principal specified uses comprise also:— 2,715 trees for sleepers, 29,277 for paling, 15,588 for fuel, 10,411 for furniture and building purposes, 7,488 for carts, wagons, &c., and 2,170 for clog soles.

In addition to the information regarding the total area under woods and plantations, returns were obtained in 1900 showing the proportion of the area entered under this heading occupied by each of the various kinds of trees. According to these returns, 46,948 acres of the total area (311,648 statute acres) under Woods and Plantations were under Larch, 34,677 under Fir, 16,478 under Spruce, 2,760 under Pine, 24,711 under Oak, 7,663 under Ash, 10,052 under Beech, 3,255 under Sycamore, 3,048 under Elm, 3,768 under Other Trees, and 158,288 were returned as under Mixed Trees. The area under Woods and Plantations in Leinster was 95,040 acres; in Munster, 106,951 acres; in Ulster, 57,980 acres; and in Connaught, 51,677 acres.

The inquiries made in the preceding fourteen years relative to the extent to which bee-keeping is followed in Ireland, and the degree of success attained in this special branch of rural economy, were repeated last year with reference to the season of 1899. According to the returns received, there would appear to have been an increase of 41·7 per cent. in the quantity of honey produced in 1899 as compared with the preceding year, the returns for which showed an increase of 37·8 per cent. as compared with the quantity in 1897. The quantity of honey produced, according to the returns, was 745,692 lbs.; of this, 205,947 lbs. were produced in the province of Leinster; 221,313 lbs. in Munster; 197,609 lbs. in Ulster; and 120,823 lbs. in Connaught. Of the 745,692 lbs., 480,062 lbs. were produced "in Hives having Moveable Combs," and 265,630 lbs. "in other Hives." It was stated that 304,341 lbs. was "Run Honey," and 441,351 lbs. "Section Honey." The number of stocks brought through the winter of 1899-1900 amounted to 31,045; of which 15,530 were in hives having moveable combs, and 15,515 in other hives. According to the returns collected, there were 4,783 lbs. of wax manufactured in 1899, of which 2,460 were from hives having moveable combs, and 2,413 lbs. from other hives. The returns received in 1899 gave the number of swarms at work during the season of 1898 as 21,330; the quantity of honey as 526,374 lbs.; the number of stocks brought through the winter of 1898-99 as 26,521; and the quantity of wax manufactured in 1898 as 5,048 lbs. These figures show that the Irish bee-keeping industry is progressing hopefully.



Type of Weight-carrying Hunter.

THE IRISH HORSE-BREEDING INDUSTRY.

Irish-bred horses enjoy world-wide celebrity. As "stayers" in the hunting field and as weight-carriers in steeplechases, they have won enviable repute, and their great wealth of bone and unquestioned stamina and mettle are to-day, as many years ago, the admiration of equine enthusiasts the world over. To have Ireland as its birthplace is reckoned one of the best credentials which a hunter can possess, and, all things else being equal, a horse of Irish origin will invariably find a purchaser at a substantially better price than that of any other country.

To what is this universally acknowledged excellence of the Irish-bred hunter due? Much has been written upon the subject, and the number of opinions expressed upon the point have been so varied as to be quite perplexing. Some authorities attribute it to the special suitability of the soil of the greater part of the country for the production of big-boned, light horses; others claim the credit for the Irishman's inherent love of a good horse, and his consequent good judgment and discernment in the selection and perpetuation of animals possessing the best characteristics of the type which he favours. Others, again, will have no other explanation than that the Irishman is naturally partial to "a bit of blood," and, as a result, depends very largely upon the thoroughbred for imparting the necessary quality, pluck, and endurance to the animals bred by him.

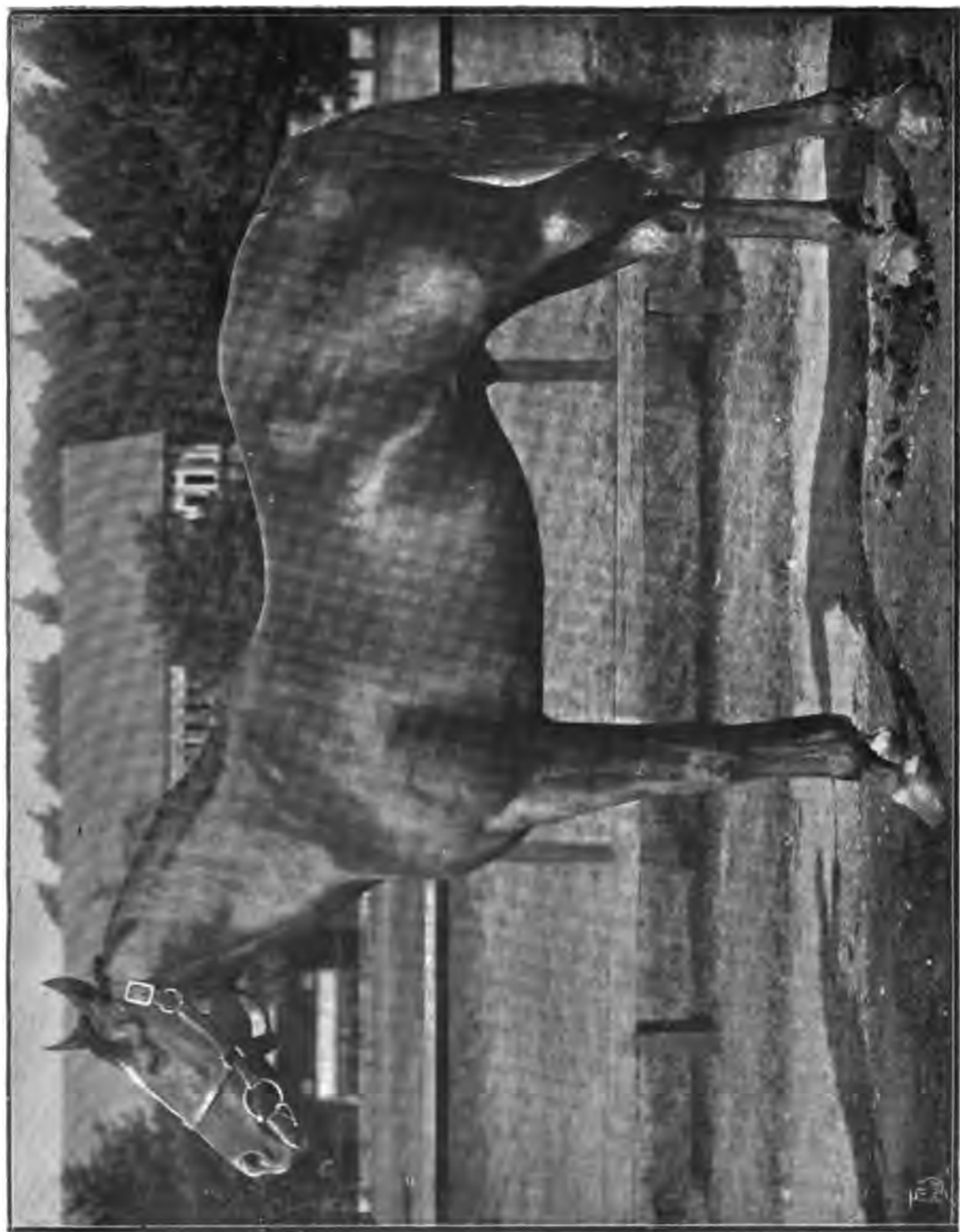
In neither of these views, however, is the correct solution of the question to be found, though it cannot be denied that all three help to play an important part in the evolution of the Irish hunter. More important than either of them—possibly more important than all three put together—is the influence exercised by the mares by which these hunters are produced. There are other countries than Ireland in which the soil is largely calcareous; there are others than Irishmen in whom the love of a good horse is not an unknown quantity; and there are certainly other parts of the kingdom in which thoroughbred sires are much more extensively employed than in Ireland; yet in none of these countries do we find light horses possessing anything like the grand combination of speed, stamina, and carrying power for which the Irish hunter has always been famous.

Why this failure elsewhere to breed hunters able to hold their own with those emanating from Ireland? In the opinion of the writer, the explanation is to be found in the lack of the mares which form the foundation upon which the structure of Irish hunter-breeding rests. It is customary to accord the credit for much of the admitted excellence of the Irish-bred hunter of the present day to the thoroughbred sire by which he is, in a good many cases, got; and no one with any knowledge of the subject will for a moment question the beneficial influence exercised by the thoroughbred sire in this connection. But, in considering this matter, it should not be overlooked that, long before the thoroughbred had been heard of, Irish hunters had acquired an international celebrity, and had been largely exported to different European countries for use in the studs of the noble and the wealthy

there. This shows that the reputation of the Irish hunter is not of to-day or yesterday, and that it has been acquired not altogether so much through the medium of the thoroughbred, as is sometimes supposed.

What manner of mare, it may be asked, is this famous "old Irish" dam to which the Irish hunter is said to owe so much? Broadly speaking, she is of medium size, 15.1 to 15.2 in height, short in her back, powerfully knit across the loin, and well-developed in her hind quarters. In general outline she is of the low and roomy type; she stands close to the ground, is very muscular in her fore-arm, and clean and flat in her bone below the knee. Though so deep and well-balanced in outline as to give the impression of being on the small side, she covers a lot of ground, and her legs are devoid of anything approaching the nature of "feather." As a rule, the head is fine and clean cut in outline, though "coarseness" is more frequently seen in this than in any other part of the body. The neck is long, the shoulder well laid, and, as becomes mares specially adapted for the production of high-class saddle-horses, the withers are high and the ribs well sprung. The brief outline thus given of her general appearance would not go to represent the Irish mare as possessing many special attributes calculated to distinguish her as a hunter-breeder. Thousands of mares possessing the same points in equal perfection are to be met with all over the kingdom, yet they do not possess any claims to special recognition as hunter breeders. But it is not to her looks alone but to a natural hardihood of constitution, begotten of the conditions under which she is kept and the work at which she is engaged, that the progeny of the Irish mare are indebted for many of the good qualities possessed by them. Quite a large percentage of the mares by which Irish hunters are produced are the property of small farmers, who use them for every class of work on their holdings—for ploughing or harrowing one day, for hauling heavy loads of farm produce the next, and on the third, perhaps, for driving to market at an eight or nine miles an hour trot. The land being for the most part light, the farms small, and the number of purposes for which the horses are required varied, it naturally follows that the type cultivated is of medium size and "handy" at the performance of such work as the animals are called upon to perform. Seldom very generously fed, and usually obliged to "rough it" in all weathers these mares have acquired a hardiness, a staying power, and a physical fitness which stands to them in good stead in their capacity as breeders. The result is the evolution of the clean-limbed, hardy, active, and spirited type of horse which has done so much to help the Irish hunter in establishing its great reputation.

Unfortunately for the country, the breeding of these "old Irish" mares has not hitherto received the attention which it merited. Numbers of them have a dash of thoroughbred blood in them, but the majority are got by sires of such mixed breeding that from the standpoint of pedigree they are but mere mongrels. This has told very much against the development of the hunter-breeding industry in Ireland, because it has rendered the business so precarious as to deter many from entering upon it. The uncertainty of hunter-breeding as at present carried on is proverbial. But it is only natural. Stock-owners of experience do not require to be reminded that, in breeding animals of any kind, no definite results can be counted on unless the materials used—the sires and dams employed—are purely bred. A



Stallion, typical of a good class at present standing in Ireland.

breeder can never tell what type of animal he will have presented to him as a result of the union of unpedigreed parents; the progeny may "throw back" to an ancestor of several generations previously, and thus present points or characters altogether at variance with those which might have been expected from the appearance of the sire and dam. So it is with hunter-breeding; and so it will be until steps are taken to found or establish a breed of mares possessing the necessary pedigree, and capable of imparting size and substance to their progeny—points in which Irish mares have always excelled.

Because of the great reputation which the Irish-bred hunter has earned abroad, there is a very general impression that it is only for the production of hunters that Ireland is worthy of notice as a horse-breeding country. This is far from being the case. Famous though the country is for its hunters, the number of animals of this class annually produced bears but a small proportion to the number of other horses bred. Last year [1900] the number of horses in Ireland was about 600,000, and of these it may be assumed that 100,000 were brood mares. Of the 70,000 odd foals produced by these mares, it is safe to assume that not more than ten per cent will ever change hands as hunters; of the remainder, the great bulk will become vanners, troopers, carriage horses, or animals retained for general purpose work on the thousands of small farms which stud the country. A certain percentage will also be of the heavy, cart-horse type; but the number of heavy horses bred in the country is very small—remarkably so in comparison with the corresponding figures for England and Scotland.

Except in a few districts in the neighbourhood of the larger towns, the breeding of cart-horses of the Clydesdale and Shire type is but little carried on in Ireland. Sires of these breeds have been tried in many districts, and in some places they have been found to give good results by imparting more substance to the native stock; but the advantage of the influence exercised by them in this direction has been confined to localities in which the soil is heavy and the farms of fairly large size. Over the greater part of the country neither of these conditions holds, and wherever the farms run small and the land light the smaller, smarter, and more generally useful native cart-horse continues to more than hold its own against its massive rivals, the Clydesdale and the Shire.

These native cart-horses are of very mixed breeding. They are got, for the most part, by common "country sires," and the latter are bred *every way and any way*. Some of them have a dash—often very remote—of the thoroughbred in them, and in many districts some are not altogether free from an admixture of Clydesdale or Shire blood; but, whatever their breeding, it is generally conceded that for whatever merits they possess as stock-getters they are principally indebted to the strong infusion of "old Irish" blood which they inherit. It is to this that their progeny chiefly owe the strong, clean bone, the hardy constitutions, and the great grit and determination which Irish-bred horses are noted for displaying when called upon to perform any particularly trying class of work.

It is from the ranks of these "promiscuously-bred" light horses that the majority of the animals which are sold every year at Irish fairs as troopers, vanners, and carriage horses are recruited. Many of these, troopers, vanners, and general purpose light horses, are, it is true, got by thoroughbreds; when the gets of thoroughbred sires fail to pass muster as hunters they are sent to join the common throng, and are known in

the trade as "mis-fits." Occasionally, very fine heavy-weight hunters are got by these common sires when mated with half-bred mares, but, as is well known, tip-toppers of this type are distinctly the exception. The majority of the animals owning these country stallions as sires are usually found wanting in one or other of the prime essentials of a high-grade hunter, and when they come to be marketed they have to take their places, not with the chosen few likely to run into three figures, but with the less aristocratic, if not less useful, group to be sold as troopers, vanners, and general purpose light horses.

Though the Hackney has come very much to the front in Great Britain during the past fifteen or twenty years, it cannot be said to have yet made very much progress in the country. That there is a great prejudice against it in the principal hunter-breeding districts is indisputable. A five minutes' conversation with any one practically interested in hunter-breeding in Ireland usually suffices to afford voluble, if not very convincing evidence of this. So far, the Hackney's sphere of influence has been almost entirely confined to the North. Outside the Province of Ulster the only studs of the breed in Ireland are one in the neighbourhood of Dublin and another in the County Galway. The breed is practically unknown in the South: the writer has been a regular visitor to all the Shows held in Ireland during the past fifteen years, and in that time he does not remember to have even once seen a Hackney at a Show held South of Dublin. Some years ago the Congested Districts Board for Ireland introduced a number of Hackney sires with the object of improving the horses and ponies kept by the small farmers and cottiers living along the Western coast, but the results do not appear to have altogether justified the expectations entertained by its admirers regarding the usefulness of the Hackney for that purpose. For the present the influence of the breed may be said to be confined to a few districts in Ulster, and even there the extent to which it is kept is but very small in comparison with other breeds.

In addition to the thoroughbred, the Shire and Clydesdale, the native cart horse, and the Hackney, there are also

Irish Ponies. to be found in Ireland several races of ponies or small cobs. Among these special mention

deserves to be made of the Connemara and the Cushendall ponies---the first named a native of the bare, bleak moors of Western Galway and Mayo, and the other a native of the mountainous districts of North Antrim. Neither of these has, unfortunately, been bred on systematic lines: both may, indeed, be described as the natural products of evolution and environment. Of the two the Connemara is the best known. Animals of this breed are inclined rather to the cob than the true pony in the matter of size. In their native haunts many of them stand up to 14 hands 1 inch and 14 hands 2 inches, and when sold as yearlings and transferred to good land they frequently grow to a height of fully 15 hands. Connemara ponies are to be obtained in all colours: grey seems, however, to be the prevailing shade. On account of the lack of systematic selection in their breeding they cannot be described as of a fixed or definite type. Some are long and loosely made in outline, while others are short, stout, and quite cobby in build. They are all, however, remarkably hardy, and are possessed of more speed than is usual in animals of their class. They are also noted for their staying powers: in this respect, indeed, they excel. One of them will go through a long and fatiguing day's work, in saddle or harness, and will turn out next morning in as fresh and fit a condition as if it had not been in harness



Type of High-class Agricultural Stallion.

for a week. Though not noted for any brilliancy of action (showy action could not reasonably be looked for in view of the conditions under which the breed has been developed), Connemaras are proverbially sure-footed, and there is reason to hope that, with the exercise of more care and attention in their selection and breeding, they may yet work their way to the front as one of most generally useful of the larger breeds of ponies in the kingdom. Already good results have been obtained by crossing them with small thoroughbreds for the production of polo ponies: when they come of the right type from this breeding, they have the reputation of being second to none for smartness, lasting power, and "general intelligence" in the polo field.

According to the official returns, there were in Ireland last year (1900), 567,000 horses of all kinds. This shows a falling off of about 13,000, as compared with the previous year—largely due, no doubt, to the exceptional demand made upon the equine resources of the kingdom by the war which broke out in South Africa in the closing months of 1899. Horse-breeding has long played a very important part in Irish farming systems; but considering the great change which has taken place in the agriculture of the kingdom at large during the past half century, the position of this industry in Ireland must be regarded as having under gone very little alteration in that time. In the year 1850, the number of horses in Ireland was 526,757, and at no period in the intervening years did the numbers fluctuate to any remarkable extent, though the usual influences of supply and demand led to repeated variation in the numbers bred from decade to decade. High water mark in the country's history as a horse-breeding centre was reached in 1895, when the official returns show Ireland's equine population to have amounted to 630,287. The subjoined table shows the average numbers of horses in the country at each decennial period since 1851:—

Year.	No. of Horses in Ireland.
1851, - - - - -	521,706
1861, - - - - -	614,232
1871, - - - - -	538,095
1881, - - - - -	548,354
1891, - - - - -	592,819
1900, - - - - -	566,978

The official returns do not give any clue to the respective numbers of the various breeds or types of horses in the country. All the information as to classes available is that a certain number were employed for agricultural purposes, a certain number for traffic and manufactures, and a certain number for recreation and amusement. The figures given under this heading for last year are as under:—

Agricultural purposes, - - -	369,685
Traffic and manufactures, - - -	46,344
Recreation and amusement, - - -	29,478
One and under two-year olds, - - -	64,448
Under one-year olds, - - -	57,023

Total, 566,978

Though no particular county or district can be said to enjoy special distinction for the production of any of the breeds of horses already

referred to as bred in the country, Ireland may be divided into four separate horse-breeding areas. These may be arranged as under:—

- (1.) The eastern seaboard from Wexford to Londonderry, for heavy cart horses;
- (2.) The midland and southern counties—in fact the whole country south of the Boyne—for hunters;
- (3.) The greater part of Ulster, for “general purpose” horses; and,
- (4.) The western seaboard—principally Galway and Mayo—for ponies.

These divisions must not be regarded as at all absolute, for many good hunters are bred in the North just as some good heavy horses are produced in some of the best hunter-breeding districts of the South. Speaking generally, the following counties may be regarded as most noted for the production of the different types:—

HUNTERS.—Cork, Limerick, Tipperary, Waterford, Wexford, Carlow, Kildare, Meath, Westmeath, Galway, and Roscommon.

HEAVY CART HORSES.—Dublin, Louth, Antrim, Down, and Londonderry.

GENERAL PURPOSE LIGHT HORSES.—The whole country.

PONIES.—Western Galway and Mayo, and North Antrim.

Though complaints about the decadence of the Irish bred hunter have been frequently heard during the past twenty years, there is reason to believe that at no date within the memory of the present generation was the horse-breeding industry of the country in such a healthily vigorous condition as at the present time, and there is also good reason for the assertion that at no period for many years was the outlook for the future so full of promise. Through the medium of an annual public grant of £5,000 administered by the Royal Dublin Society, much has been accomplished in the direction of encouraging breeders to pay more attention to the selection of their mares and to the use of a better class of sires, and as the Department of Agriculture and Technical Instruction for Ireland, which came into existence last year, is making the improvement of horse-breeding one of the principal planks in its platform, still further advance in the same direction may be looked for within the next few years. The Department have already formulated a comprehensive scheme of stock improvement under which small farmers will be supplied with the services of sires which they could not otherwise obtain; in the case of thoroughbred sires these services will be obtainable to three guinea horses at the nominal fee of 2s. 6d. This scheme is being worked in conjunction with the various local bodies throughout the country, and it speaks well for the local enthusiasm with which the work of general stock improvement has been taken up, that all but two of the thirty-three County Councils have adopted the scheme, and are at present actively engaged in giving it effect in their respective localities.



Fig. 2. Connemara Pony and Foal (Rich Yellow Dun)—Andalusian Type.

THE PONIES OF CONNEMARA.

I. THE DIFFERENT TYPES OF PONIES.

One of the first questions to be considered on proceeding to study the horses of any given area is—Do they form a distinct indigenous breed, or are they to a large extent a mixture of several imported breeds? Hitherto it seems to have been commonly taken for granted that the Connemara ponies—like some of the ponies of the Western-Highlands, and Islands of Scotland—have descended from Andalusian horses which escaped in 1588 from the ships of the Spanish Armada; and further that they deserve to rank as a distinct breed side by side with the Iceland, Shetland, and Exmoor ponies. An indication of the prevailing opinion as to the ponies in question may be gathered from a recent paper* by Sir Walter Gilbey. In describing the ponies ("Hobbies") of Connemara, Sir Walter states that they are from 12 to 14 hands high, generally of the prevailing Andalusian chestnut colour, delicate in their limbs, and possessed of the form of head which distinguishes the Spanish race. "It must be regarded as remarkable," he adds, "that these ponies should retain the characteristics of their race for so long a period in a country so different from that whence they were derived. They have merely become smaller than the original race, are somewhat rounder in the croup, and are covered in the natural state with shaggy hair From mere neglect many of them are extremely ugly yet still conforming to the original type." But while regarding these ponies as essentially Spanish, Sir Walter believes they were introduced, not through the wreck of a ship, but direct by importation from England.

Had the horses of Connemara been isolated since the time of the Armada, or even since the middle of the 17th century—when Spanish horses common in England might have found their way to the West of Ireland—they would doubtless have formed ere this a perfectly distinct and fairly uniform breed. However uniform and Andalusian-like the Connemara hobbies may have been in the past, there is an amazing want of uniformity about them to-day, and as a result of this there is in the West of Ireland a complete absence of agreement as to what is or what is not a true Connemara pony.

This is exactly what might have been expected, for, in the first place, long before the Congested Districts Board set about providing hackney and other stallions, foreign blood seems to have been again and again introduced; and in the second place no one has yet done for the Connemara ponies what the late Mr. Knight did for the ponies of Exmoor, or what Lord Londonderry and others have done for the Shetland ponies—no one has yet blended the more marked characteristics of the various kinds of Connemara ponies into a distinct strain or breed.

During a recent visit to the West of Ireland I had the opportunity of seeing something of the native ponies, the conditions under which they are reared and maintained, and the kind of work they are called upon to perform. Soon after reaching Connemara, I was struck with "the strength, endurance, and easy paces" of the ponies, with their

* Ponies—Their past and present history.—*Live Stock Journal Almanac*, 1896—page 45.

intelligence and docility, and with the capacity for work under conditions which would speedily prove disastrous to horses reared under less natural conditions. But, as already indicated, I ascertained that even amongst the so-called real Connemara ponies (*i.e.* ponies which claim no kin with what are familiarly known as the "Congested" horses recently introduced), there is an all but complete absence of uniformity alike in size, make, colour, and disposition. From what I saw of the ponies between Maam Cross and Leenane and at, or on the way to Cashel, Carna, Clifden, and other centres, I have come to the conclusion that the Connemara ponies, instead of forming one breed, may be said to belong to five fairly distinct types which may be known as—

- (1.) The Andalusian type;
- (2.) The Eastern type;
- (3.) The Cashel type;
- (4.) The Clydesdale type, and
- (5.) The Clifden type.

1.—THE ANDALUSIAN TYPE.

This group includes what some would probably call the original or old Connemara breed. In many ways the members of this section resemble ponies still to be seen in Andalusia, but they also bear an even more striking resemblance to some of the New Forest ponies. They vary from 12 to 13 hands; some are black, others gray or chestnut, but the most characteristic specimens are of a yellow dun colour. Fig. 1 represents the most typical member (a yellow dun) of the Andalusian type I came across; Fig. 2 a pony of a somewhat richer yellow tint also belongs to this section, though finer in the bone and with the long pasterns often seen in New Forest ponies, while Fig. 3 is a light gray with shorter pasterns, and a measurement below the knee of 7 inches. The pony represented in Fig. 1 measures $50\frac{1}{2}$ inches ($12\cdot2\frac{1}{2}$ hands) at the withers, the girth is 60 inches, the length from the point of the elbow to the ground 30 inches, from the point of the hock to the ground 20 inches, and the circumference below the knee is $6\frac{1}{2}$ inches. From the top of the head (occipital ridge) to a line connecting the upper margin of the nostrils is 20 inches; from the inner corner (*canthus*) of the eye to the upper margin of the nostrils $9\frac{1}{2}$ inches, and between the inner angles (*canthi*) of the eyes 7 inches. The ear measures $5\frac{1}{4}$ inches.

The ponies represented in Figs. 2 and 3 closely agree in size with the one described. All three appear to be slightly roach-backed, but this is perhaps due to their being decidedly out of condition. In many horses there is a slight rise in the back, a short distance in front of the croup, but as a rule this elevation is obscured by the spinal muscles. Barbs are sometimes decidedly roach-backed. It is quite possible that the Connemara ponies have inherited this tendency from their Spanish ancestors.

2.—THE EASTERN TYPE.

This section includes ponies which stand in very much the same relation to the desert Arab that the Andalusian section does to the Barb—an African variety of the Arab breed.

In a former generation most of the "Hobbies" of Connemara may



Fig. 1. Light Grey Connemara Pony—Andalusian Type.



Fig. 3. Connemara Pony (Yellow Dun)—Andalusian Type.

have been of a chestnut colour; but to-day, greys, if not the prevailing colour, are at least far more common than chestnuts. That the grey colour persists when once introduced into a district is widely recognised both in England and on the Continent, more especially when it is the flea-bitten grey of an Arab. The numerous greys in the New Forest are believed to count Arabs amongst their ancestors, while the greys so frequent amongst the Orlof trotters sometimes reproduce the characters of the Arab (*Smetanka*), largely concerned, more than a century ago, in establishing this famous Russian breed.

When the history of Irish horses is studied it will probably be found that Arabs were introduced into Connemara about the end of the eighteenth century, and now and again during the present century. Otherwise the resemblance to Eastern horses so often noticed in Connemara ponies could hardly be accounted for. Fig. 4 represents a light grey filly brought into the Clifden market during my visit in September.

3.—THE CASHEL TYPE.

A member of the Cashel type (a gelding) is represented in Fig. 5. This gelding, also a son of the old Cashel stallion, has been regarded by some as one of the best and most typical living examples of a Connemara pony. It is, however, very different from the old-fashioned dun-coloured ponies (Figs. 1 and 2), and it neither forcibly suggests an Arab nor a Barb, nor yet the short-legged, highly characteristic ponies (Clifden variety) described below. The gelding figured is a very hardy pony, strong and willing when in harness, and pleasant and safe to ride.

The typical members of the Cashel group are characterised by a long head, high withers and long fore-legs, in all of which points they differ from Arabs. They also differ from Arabs in having short ears—in this only may they be said to agree with typical ponies. In the gelding (Fig. 5) the measurements are as follows:—Ears, $5\frac{1}{4}$ inches; head, from occipital ridge to line between upper margin of nostrils, 21 inches; between the eye and the nostril, 11 inches; between the eyes, $7\frac{1}{2}$ inches; height at withers, 56 inches; length from elbow, 34 inches; and from hock, 22 inches; girth, 60 inches; and circumference below knee, $7\frac{1}{2}$ inches.

In measuring 11 inches from eye to nostril, and 34 inches from elbow to ground, and in having a girth of only 60 inches, the Cashel type departs decidedly from the pony standard, and in having fairly high withers—a result of the large head, and not of a greater obliquity of the shoulders—they are unlike typical Eastern ponies. At the present moment a considerable proportion of the Connemara ponies are the offspring of the old Cashel stallion. When at his best he seems to have been noted for his strength, speed, and great staying power, and for his impressiveness as a sire. Of his direct descendants I only heard of two stallions of any note—the sire of the filly (Fig. 6) and the sire of the dark grey stallion (Fig. 7); but both, like their aged sire, are past their best.

Were enquiry made it might be found that there are a considerable number of mares belonging to this section of the Connemara ponies. Carefully selected mares built on the Cashel lines would, I believe, produce excellent stock if put to a good Arab. Fig. 10 represents the head of a yellow dun mare by the Cashel horse, in which several of the Connemara types are happily blended. In this case the

powerful loins and legs of the Cashel strain have been retained, while the head has been refined and the depth of the ribs increased. One of the great advantages of the Connemara ponies is that they have not suffered from in-and-in breeding, hence—unless they happen to be naturally prepotent—they readily assimilate the more marked points of other breeds. Mares built on the lines of the yellow-dun would probably produce excellent stock to a not over-potent Arab, or a stout short-legged, hardy reared thoroughbred.

4.—THE CLYDESDALE TYPE.

In a run through Connemara one sees at rare intervals stout, cob-like ponies that seem to combine the characters of a deerstalker's pony and the now all but lost Douglas breed of horses—ponies capable of carrying heavy loads, and when occasion requires covering great distances at a fair speed. They are said to inherit their strong limbs, great girth, and powerful loins from Clydesdale sires introduced thirty or forty years ago. This explanation is supported by the wealth of hair at the fetlocks, by the small head, and by the offspring varying considerably—sometimes presenting gaudy colours—*e.g.*, a white bald face, such as one frequently sees in even fashionably-bred Clydesdales. All the three seen by me were black, or nearly black, and of about the same size.

5.—THE CLIFDEN TYPE.

The ponies included in this section, though but little larger than the members of the Andalusian (old Connemara) type, are very different in build. The head is beautifully moulded, and the face highly suggestive of marked intelligence, the ribs are well arched, the shoulders good, and the loins and hind quarters well developed, while the short legs are so constructed that they stand an enormous amount of wear, often looking as perfect after a score of years' continuous work as in a three-year-old colt. These short-legged, stout Connemara ponies, though differing from Spanish ponies, undoubtedly belong to an old strain. Those best acquainted with Irish ponies would probably regard the members of the Clifden section as representing the best kind of Connemara ponies, as deserving to be regarded as the most typical Connemaras existing at the present day.

During my visit to the West of Ireland I saw quite a number of short-legged mares that presented the more striking characters of the Clifden strain; but I neither saw nor heard of any pure-bred foals or stallions of this, in many ways, the most valuable of all the types of Irish ponies. The Clifden breed seems to me to be well worth preserving, not only because well adapted for the country, but also because it would prove invaluable for crossing with other breeds. There are no where else, as far as I know, in the British Islands, ponies with so much stamina as those I have included in the Clifden section. As already indicated, they are more horses on pony legs than true ponies, which implies they can be readily "improved" either by better treatment during the first winter or by crossing. Some of them crossed with Arabs would give, I believe, ideal ponies for mounted infantry, while others crossed with carefully selected hunter sires, or with hardy, non-impressive thoroughbred horses, would produce remounts for light cavalry as large as are likely to be of use in, or capable of surviving under the trying experience of,



Fig. 5. Connemara Gelding—Cashel Type



Fig. 6. Connemara Pony, Bred in the Vicinity of Clifden.



Fig. 4. Light Grey Connemara Filly, Rising 3 years—Eastern Type.

actual warfare. When the mild climate and the extent of the moors and mountains of Connemara are taken into consideration, it may, I think, be safely asserted that Connemara could produce ponies—say one thousand annually—suitable for mounted infantry (alike in size, hardiness, staying power, and intelligence), at a lower figure than any other district in Great Britain or Ireland.

I ought to refer here to a small breed in process of formation in the vicinity of Clifden. One of these ponies is represented in Fig. 6. The owner of these ponies informs me that he has always bred from small mares, with the result, as the figure suggests, that his stock presents all the characters of true ponies, and are hence in their build more like Shetland or Welsh ponies than the smaller members of the Clifden breed, and though about the same size they differ considerably from the old Connemara duns which are supposed to bear the greatest resemblance to Andalusian horses.

2. THE ENVIRONMENT OF THE PONIES.

In addition to considering the races or breeds to which the ponies of any given district belong, it is necessary to take into consideration, amongst other things, the conditions under which they are bred and reared—to take cognizance of the environment

(1.) Size and Uniformity.

as well as the ancestry. But before discussing the external conditions, I ought, perhaps, to insist again on the fact that, whatever may have been the case in the past, a distinct breed of Connemara ponies does not now exist. Amongst Arab and other Eastern breeds there is a considerable range of variation, just as there is variation amongst the oldest strains of Norwegian and other western breeds. Nevertheless, it is generally possible at once to say whether any given horse is an Arab or a Norwegian. It is, however, difficult—in most cases impossible—to decide whether any given Irish pony has been bred in Connemara.

A century ago the Connemara "hobbies" may have been a fairly uniform blend of the slender Oriental and stout Occidental races, but to-day there is a complete want of uniformity, doubtless because the people of Connemara, unlike the Anazah and other desert Arabians, have long been breeding from all sorts and conditions of mares and have been, as a rule, strangely indifferent as to the pedigree of the stallions.

Have we, in the West of Ireland, and more especially in the west of Galway, an environment likely to produce, without the help of man, ponies as large, hardy, and vigorous as the Galloways, so indispensable in many parts of England and Scotland until railways revolutionised our modes of travelling and transport?

A satisfactory answer to this question can hardly be attempted without a brief reference to the more recent ancestors of the Equidæ, and to the geology and physical features of Galway.

Up to the end of Miocene times, the ancestors of the recent Equidæ were still three-toed, and were provided with relatively short and simple molars. The three hoofs plainly indicate that the Miocene horses lived near lakes, rivers, and marshes, while the short crowns of the teeth as plainly show that they fed throughout the year almost exclusively on soft, easily crushed plants.

(2.) The more recent Ancestors of the Horse.

they fed throughout the year almost exclusively on soft, easily crushed plants.

In course of time the three-toed Miocene horses gave place to their larger and more highly specialised one-hoofed Pliocene descendants.

As the outer hoofs dwindled in size, the crowns of the molars (the six large cheek teeth) increased in length and complexity, with the result that the Pliocene horses were eventually splendidly adapted for moving rapidly over wide open arid plains, steppes, and plateaux, and among the foot-hills of great mountains, and for dealing with coarse dry shrubs as effectively as with grasses and soft herbage.

Since the various living breeds of the domestic horse are practically identical with their Pliocene ancestors, it follows, that in considering the suitability of any given area as a centre for breeding and rearing an active, hardy variety, it must be borne in mind that the Equidæ, far more than sheep or cattle, are adapted for leading a wandering, unfettered life, feeding, during at least a part of the year, not so much on soft grasses (which more often improve the condition than the fitness) as on various kinds of coarse, dry plants (heaths, gorse, roots, twigs, and the like) so hard and fibrous that they gradually wear down the hard enamel ridges of their long-crowned complex teeth.

To understand the physical conditions of the west of Galway, one must bear in mind that Ireland is especially characterised by a great central plain, which occupies about two-thirds of the total area. The central plain might be described as a huge, shallow, irregular basin, floored with carboniferous limestone, and surrounded by an irregular, highly-embossed, mountainous rim, wide at some parts, narrow at others, or altogether absent (as at Galway and between Dundalk and Dublin).

Connemara forms part of the rim of the great central plain. Reference to a map shows that the outer edge of the Galway section of the rim or fringe is indented by numerous bays and channels, many of them studded with rocks and islands. In the north a long narrow channel (Killary Harbour) separates Galway from Mayo, while on the east two rock-basins (Lough Corrib and Lough Mask) separate the great plain from the most western part of its rim.

A survey of the interior of Connemara shows, in the north, a remarkable plateau—the table-land of Slieve Partry or “Joyce’s Country”—and ledges and terraces, extending from Lough Mask towards Muilrea (2,688 feet) on the Mayo side of Killary Harbour. Between the Partry table-land and Clifden lie the dome-shaped Twelve Bens or “Pins,” which in Benbaun reach an elevation of 2,395 feet. East of the Pins are the Maunturk Mountains.

Between Clifden and Galway Bay in the south, hills and mountains occur in every direction. Between the mountains are numerous valleys, which sometimes expand into wide moors, often divided into irregular patches by small lakes and streams. Numerous lakelets form the meshes of an intricate network to the south of Clifden, and they are also abundant in the vicinity of the deep indentations of the south-western shore. It thus appears that, in having numerous hills and uplands, well-watered valleys, and wide moors often but little above the sea-level, Connemara provides sufficient space and variety for many wandering herds of horses. In the background some of the “Pins” are visible. In Fig. 7 a number of ponies are seen amongst their native mountains.

It is, however, not so much the configuration of the country as the climate that claims consideration. The average winter temperature is



Fig. 7.—Ponies on the Connemara Mountains.
(From "The Sphere.")

said to be about the same as that of the south of Europe (44° Fahr.). This high average it owes to the Gulf Stream, which extends into the many bays and channels, and from the warm surface of which, throughout a considerable part of the year, soft moisture-laden breezes penetrate far inland, not only in the direction of Lough Mask and Lough Corrib, but also beyond the "Pins," towards the Partry tableland. The high temperature, together with the moisture, implies that grasses, heaths, and other plants begin to grow early in the Spring, remain fresh and green throughout the Summer, and retain their nutritive properties almost undiminished during the Winter. It is largely for this reason that Connemara has the advantage over the New Forest, Wales, and other pony districts in England, and also over Sardinia, Sumatra, and other Southern Islands, in which, notwithstanding the high average temperature, the naturally-reared horses are little larger than the dwarf ponies of Shetland.

In selecting a district for breeding ponies under natural conditions, it is as necessary to consider the underlying rocks and the soil covering, and in most cases derived from, them, as it is to direct attention to the climate and physical features.

(4.) The Soil and Underlying Rocks.

Had all the rocks in the west of Galway consisted of quartzite like the Twelve Bens, or of granite such as occupies a wide area to the north of Galway Bay, or of metamorphosed rocks such as underlie and predispose to the formation of the extensive bogs of Mayo, Connemara would never have been famous for ponies. Green plants are incapable of growing unless supplied with lime, and they only flourish when lime is present in the soil in sufficient quantity and when it is accompanied by certain other chemical substances, such as potash and phosphoric acid. In most cases the soil is indebted for its lime to the rocks over or near which it lies. It is, however, well to remember that some limestone districts are extremely barren, while some districts, destitute of limestone deposits, are highly fertile, and that in some areas the whole of the soil is of foreign origin.*

In the west of Galway, notwithstanding abundant evidence of glaciation and the presence of numerous glacial deposits in the uplands as well as in the valleys, the soil has, to a very large extent, resulted from the weathering of the native rocks. According to the geological survey, a considerable number of glacial deposits occur between Lough Mask and Killary Harbour and over the low-lying area extending between the wide upper portion of Lough Corrib and the Atlantic, i.e., in Connemara proper. Other patches of boulder clay occur in the southern granitic area between Connemara proper and Galway Bay. Some of these deposits doubtless consist of drift boulder clay carried from the great central plain, but the majority are of local origin—relics of district and local glaciers. The boulder clay from the central plain is likely to be rich in partially disintegrated carboniferous limestone, while the local deposits north of the granitic area are doubtless rich in lime-salts derived from the schists and basic igneous rocks in the vicinity of Lough Inagh and other centres from which the ice radiated during the latter part of the glacial epoch.

In the extensive granitic region north of Galway Bay the patches of boulder clay are mostly small—they often form fertile spots in an otherwise unproductive district. There is, however, a glacial deposit of

* A striking instance of this we have in the southern states of New England where over an area of nearly 4,000,000 square miles the soil, with the exception of a few insignificant patches, consists of boulder clay carried thither by ice during the glacial epoch.

considerable extent near the centre of the southern section, but, owing to its being in great part covered by bog, it is of little value.

With the exception of the boulder clays, alluvial deposits and belts and mounds of wind-blown sand, the soil of Connemara has almost entirely been derived from the weathering of schists and igneous rocks.

A glance at a geological map of Ireland shows that a wide central band of Lower Silurian rocks extends right across Connemara from the upper part of Lough Corrib to the Atlantic. To the north of this, occupying the uplands, there is a somewhat crescent-shaped mass (about 150 square miles in extent) of Upper Silurian rocks, while the south, as already indicated, consists almost entirely of granite. A more careful inspection reveals the fact that the Lower Silurian and, to a less extent, the Upper Silurian areas include a large amount of limestone and numerous igneous dykes. The limestone mainly occurs in narrow, often nearly parallel, bands; but there is a considerable stretch of carboniferous limestone occupying a triangular area between Lough Corrib and the railway from Galway to Oughterard. The limestone bands are especially abundant between Oughterard and Clifden, to the north of the Maumturk Mountains, and between these mountains and the Twelve Bens. They are also plentiful between the Bens and Lough Kylemore and to the south-east of Ballynakill Harbour.

The igneous dykes (which often yield soil rich in phosphates) occur in great numbers in the western portion of Connemara, more especially to the west of a line between Ballynakill Harbour and Cashel Bay.

In addition to the igneous dykes there are great masses of basic igneous rocks south of the railway between Oughterard and Clifden, but especially to the south and east of Ballynahinch. The importance of igneous dykes and of basic igneous rocks can hardly be over-estimated. In Norway, *e.g.*, the villages arrange themselves along igneous dykes, being especially crowded where the dykes are most abundant and richest in phosphates.

The uplands extending between Lough Mask and Killary Harbour in many ways agree with the Ochills, Pentlands, and the Southern Uplands of Scotland. They owe their fertility to the limestone schists, and other phosphate-yielding rocks of the Upper Silurian series. To the south of the crescent-shaped Upper Silurian area which includes the Partry table-land and Joyces' country, lies the area (comprising Connemara proper), consisting almost entirely of Lower Silurian rocks. These rocks extend from Lough Corrib to the Atlantic and separate the uplands in the north from the extensive granitic area in the south. On the east the Lower Silurian rocks reach the lower end of Lough Mask; south of Oughterard they come into contact with the triangle of carboniferous limestone lying to the east of the railway. On the Atlantic side they all but extend to Killary Harbour in the north, and in the south they come into contact with the granitic area in Bertraghboy Bay not far from Carna. In the Lower Silurian area to the north of Ballynahinch lie the Twelve Bens; further east the equally barren Maumturk Mountains. With the exception of these sterile quartzitic mountains, the soil of the Lower Silurian section, wherever it exists in sufficient quantity, is wonderfully fertile. The presence of limestone bands, igneous dykes, and various kinds of schists insures a plentiful supply of lime, potash, and phosphoric acid. The granitic area extending from the Lower Silurian section to Galway Bay though, as a rule, but little above the sea level, and though crowded with lakelets, intersected by numerous streams and deeply indented on the west by

bays, channels, and creeks, is of little value for agricultural purposes. This is partly due to the presence of extensive bogs, but chiefly to the rocks being incapable of yielding suitable soil.

When the climate, physical features, and geological formations of the west of Galway are taken into consideration, there is no escape from the conclusion that Connemara is in many respects well-adapted for the breeding and rearing of stout, active, hardy ponies as large as the feral horses once so abundant in the New World, and as the horses still found wild in certain parts of Central Asia.

During the greater part of the year horses seem to prefer short young grasses and soft, easily-cropped herbs; but, as already mentioned, the length of the crowns of the teeth, together with the great length and strength of the jaws, indicate that they are well adapted for feeding on hard dry plants, which require to be well crushed before they give up their nutritive constituents.

(5.) **The Food of the Ponies.**

3.—THE WORK OF THE CONNEMARA PONIES.

Ponies are as essential to-day in Connemara as "Galloways" were a century ago in many parts of England and Scotland, and owing to the wild and rugged nature of the country, and the all but inaccessible position of many of the homesteads and cabins, the pillion and pack-saddle are not likely soon to disappear from the West of Ireland.

In England, as the result of the revolution effected in travelling and transport by railways, the existence of hardy active ponies had almost been forgotten until the South African War proved how invaluable they were for mounted infantry. In Connemara, as in the East, interest in ponies for purely practical reasons has continued undiminished for centuries. One important result of this has been that Connemara, by sending all over Ireland "colts" reared under natural conditions, has helped to gain for Irish horses their widespread reputation for vigour, hardiness, and intelligence—through Connemara Irish horses have, as it were, kept in touch with Mother Nature.

Without a pony, the peasant farmer in the West of Galway is all but helpless. Fortunately, besides the original cost, there is but little outlay, A two year old filly having been purchased, usually at a very low figure. a bridle is soon woven out of horse-hair—after the fashion, but without the artistic feeling that prevails in Arabia—and a primitive pack-saddle constructed out of four pieces of wood. The only additional pieces of furniture needed are mats or sacks to place under the saddle, and a cushion or pillion for the hind quarters, on which the owner at times sits when on the way to market; horse-hair or ordinary ropes hold the various trappings in position. The work of the ponies varies with the season of the year. At one time they may be seen climbing steep hillsides heavily laden with sea-weed, seed corn, or potatoes; at another they convey the produce to market. Sometimes it is a load of turf, oats, or barley, at other times creels crowded with a lively family of young pigs.

During summer and autumn the ponies are often seen trudging unsteadily along, all but buried in a huge pile of hay or oats, each with a puzzled foal thoughtfully bringing up the rear.

Returning from market each pony generally carries two men, one in front and the other on the pillion behind. A good pony can easily carry two men thus disposed for a considerable distance at the rate of ten

miles an hour. The women seem to be quite as much at home on the pillion as the men. In Clifden and other centres, as on the larger holdings and some of the small farms close to the main roads, cars, turf, and other carts, take the place of the pack-saddle and pillion.

4.—THE CONSTITUTION, TEMPERAMENT, AND CAPABILITIES OF THE CONNEMARA PONIES.

In Arabia, where horses are prized above all other possessions, and in England, where so much is sacrificed to appearances, make and action are often the chief points looked for ; but, in Connemara, strength and staying power, hardiness, and tractability are the main considerations. If the ponies happen to be fast and shapely so much the better.

All are agreed that the better Connemara ponies are strong and hardy, and possessed of great endurance. But all ponies reared under natural conditions and in a suitable environment have, or in course of time acquire these attributes.

Though hardiness, endurance, and strength are of vital importance, they often pass unnoticed until ponies have the opportunity of working alongside delicately-reared thoroughbred and large half-bred horses. It then becomes evident, as Sir Richard Green Price has pointed out, and as recent experiences in South Africa have so abundantly proved, that ponies "beat moderate horses of double their size," and have "twice the constitution and thrice the sense."

The reason of this difference is that large horses are highly specialised products of artificial selection, quite incapable of maintaining themselves in adverse circumstances. Nature makes short work of large horses and in a very few generations mercifully reduces to the pony standard any offspring they may happen to leave.

While one may fail to appreciate fully the grit and stamina of the Connemara ponies, it is impossible to miss noticing their intelligence and docility. In these respects they agree with Arabs, and contrast favourably with thoroughbreds. Their docility is in part hereditary, and in part the result of their upbringing. From the first, as in Arabia, they often form one of the family circle, and in course of time court rather than shun human society. Ponies which have during their youth acquired confidence in man are, except in rare cases, far more docile than ponies that run wild during the first year, or that have a chance of developing all their wild instincts before they are pressed into the service of man, as is the case with most of the Argentine horses.

Seeing that the ponies of Connemara belong to several fairly distinct types, it will be more profitable to consider what kind of pony breeders should aim at producing in the future, than to discuss the points of those now in existence. In doing this, it is important to bear in mind (1) the kind of work that falls to the lot of the average Connemara pony ; (2), that each mare is expected to produce annually a foal that will fetch a good price when six or eight months old ; and (3), that some of the cross-bred foals will be expected, under generous treatment, to reach a size of sixty inches, and develop into light weight hunters.

From what has already been said, it will be evident that many of the ponies in the west of Galway do the work of pack horses, and require to be as strong, agile, and tireless as battery mules. In mountain battery mules one expects to find powerful loins, great girth, a fairly long body, and short strong legs. Many of the old "hobbies" appear to have had all the best points of a battery mule, united to the tempera-



Fig. 8.— A Connemara Pony that has distinguished itself as a Hunter.

ment and much of the grace of an Arab, while some of them, if one may rely on Berenger and other writers, were fleet enough to outrun the best of the Eastern horses on the English turf at the end of the eighteenth century. To combine in one breed the strength of a pack horse and the fleetness of an Arab may seem impossible; but, after all, the difference between a long, low hobby and an Arab-like racer may be mainly a difference in the length of the legs, and of the parts correlated to the legs—the hobby may have been sometimes a stunted Eastern horse.

If this is the case, it may still be possible, out of native material, to produce a breed of ponies, fairly uniform in make, size, and colour, and capable not only of performing the arduous work of a small upland farm, but also, under favourable conditions, of developing into hunters, or, at least, of producing hunters to hunter sires, remounts or riding ponies to Arab sires, and hardy ponies with good action to Hackney and Welsh cob sires. That this is more than probable will be admitted, when it is remembered that during recent years many excellent light hunters and riding and driving ponies have been bred in Connemara. This has been possible, partly because the ponies are, as a rule, non-impressive, and partly because many of the mares, though unshapely and deficient in bone, belong to a good stock, and are seldom wanting in stamina. Before attempting to indicate the points that should characterize the ideal pony of the future, it will be well to submit evidence in proof of the fact that Connemara has produced excellent ponies during quite recent years. Fig. 8 represents a pony bought in 1894 out of a herd of Connemara foals. This pony, having been allowed to run at grass until it was four years old, reached a height of 15 hands, and in course of time developed into an extremely clever hunter, hard to beat as a jumper. Had he remained amongst his native wilds, at work before reaching his second birthday, he would most probably have grown into a very ordinary-looking hobby. From Mr. W. Webber, of Kellyville, Athy, and others, I have received photographs of quite a number of ponies, with a history and record similar to the one figured. One of these, bought out of a herd of foals in 1890, Mr. Webber informs me, is perfectly gentle, extremely intelligent, hard to tire, and able to jump anything a horse can jump. While another, bought in 1892, has been hunted regularly since it was three years old, and not only jumps well, but is very fast, and goes regularly in harness during the summer. Last autumn I purchased a six-year-old yellow-dun pony, which was reared, as well as bred, in Connemara. It is a blend of the Eastern and Cashel types. This pony, though only 14 hands, would make an ideal small war horse. As might be expected from her beautiful head, she is extremely intelligent and docile, and an experienced breaker says he never had a more clever or more pleasant hack in his hands. When out with other ponies she carries herself well, and is as spirited and keen as an Arab. Yet in a show of riding ponies this yellow-dun would entirely fail to find favour in the eyes of ordinary judges, for in her withers, and in the position of the tail, she falls short of the sentimental standard. In make she closely resembles some of the Arab-Barb crosses, specially bred for military purposes at the Saint George's Stud in Algiers.

During recent years, in addition to crossing Connemara mares with Arab, Barb, and thoroughbred horses, experiments have been made with Welsh cobs and Hackneys. I saw one which was a cross between a Welsh cob and one of the mares belonging to Mr. Lyons, of Tullaboy. In this

cross very little of the "hobby" is left. If Welsh cob sires are widely introduced, in a few years the Connemara ponies will be crossed out of existence; and it by no means follows that their cross-bred descendants will be adapted to the unique surroundings of the West of Ireland, or be capable of producing either to thoroughbreds or Arabs, foals likely to attract buyers from far and near.

Regarding crosses got by hackney sires, very different views are held, doubtless, because, like all other crosses, they vary profoundly, some being hackneys, pure and simple, others differing but little from their native dams. That some of the Connemara-hackney crosses gallop and jump well and are stayers is as certain as that they are, as a rule, tractable and intelligent. I am able to speak from personal knowledge of a light grey three-year-old filly purchased in Clifden. This filly, out of a stout gray mare by a bay hackney, promises to be an excellent and intelligent riding and driving pony. In being as intelligent, self-contained, and tractable as a desert-reared Arab, this Connemara-hackney cross very decidedly differs from some of the Connemara-thoroughbred crosses, which are sometimes less characterised by sense than by excessive sensitiveness. Another Connemara cross deserves mention, partly because she has won many prizes at Hackney shows, but chiefly because she has produced a number of very famous hackney colts.

Though, during recent years many excellent ponies have been reared or at least bred in Connemara, it would be a mistake to suppose that even a fair percentage of the present mares would, under more favourable conditions, have made light hunters or, when crossed with thoroughbred stallions, produced high class shapely foals. A visit to the Clifden Winter Pony Fair makes it all too apparent that the mares from the upland farms are, in most cases, unshapely and deficient in "bone," and that in make, at least, there is room for considerable improvement in the vast majority of the foals. How gradually to improve the mares all through Connemara is still a pressing question.

5.—HOW TO IMPROVE THE CONNEMARA PONIES.

In some districts an improvement in the native horses can be gradually affected by the introduction of carefully selected stallions. The circumstances in the West of Ireland are, however, so peculiar that the placing of thoroughbred stallions at the disposal of the natives may diminish rather than increase the number of good mares.

On the majority of small farms it is difficult, if not impossible, to keep a foal as well as a mare throughout the winter; hence, nearly all the foals got by stallions sent into Connemara during recent years are disposed of long before they reach maturity. Recently the demand for half-bred Connemara foals has attracted buyers from beyond the confines of Ireland, with the result that some of the best mares, as well as the best foals, have been carried off. It is, doubtless, true, that what is a loss to Connemara may be a gain to other districts; but as the demand for Connemara-bred foals is likely to increase, unless the leakage is checked, both Connemara and the rest of Ireland will eventually suffer. What makes matters worse is that when it becomes necessary to replace a mare, instead of selecting a filly belonging to a well-known local strain, as often as not a yearling or a two-year-old is purchased (often beyond the County of Galway) regardless alike of make and pedigree.

If an attempt is to be made to recover for the ponies of Connemara

the reputation they enjoyed up to about the middle of the nineteenth century, something more is obviously needed than sending high-class sires into the district.

In France there were last year over 3,000 stallions (including 262 thoroughbreds, 265 Arabs and half-Arabs, and 251 half-breeds) maintained by the Government in twenty-two separate depots at a cost to the State of £93,000.*

Notwithstanding this large expenditure, only indifferent results, it is said, have been obtained during recent years, owing partly to the common mistake of supposing that a good sire makes up for all sorts of deficiencies in the dam and partly to the fact that it is not yet sufficiently realised that, given a good dam, the less the sire counts in the offspring the better. Recognising the necessity of having a good stock of brood mares, as well as good sires, an effort is now being made in New South Wales to have Government stud farms established for breeding pure stock. Something of this kind will be necessary in the West of Ireland if it is considered desirable to perpetuate the best characteristics of the once famous breed of Connemara ponies.

There is in Arabia a tradition that all the best Desert Arabs have descended from seven mares—sometimes spoken of as the “Mares of the Prophet.” A like number of Connemara mares might be selected to start a new and improved strain of Connemara ponies.

Given a number of mares, the extremely difficult question arises—“What kind of sires should they be mated with?” An answer to this question can only be obtained by means of experiments, by breeding with native and other sires, then intercrossing in various ways the best of the pure and mixed progeny.† An experiment of this kind implies that we have formed some idea as to what should be the chief “points” of the Connemara pony of the future.

*The total sum (including prizes and premiums to owners of approved stallions) expended in providing suitable sires in France amounted last year to £247,000.

†There already exists a considerable amount of material (apart from the native mares) for experiments of this kind in the West of Ireland.

THE IRISH CATTLE INDUSTRY.

During the past century every acknowledged breed in England and Scotland has been resorted to with a view to improve the cattle of Ireland. Shorthorn sires have been so largely used during the past century, that the ordinary cattle of the country may be said to be crosses of that breed. Of late years, Aberdeen Angus and Hereford cattle have been increasing in favour in those districts where the production of beef cattle is the principal industry of the farmers. In other districts, where the farmers have to depend upon dairy produce and calf-rearing, the Shorthorn sire is still looked upon as being the most suitable for the production of general purpose stock. The following records of the number of entries of the above three breeds at the Spring Shows at the Royal Dublin Society in 1891 and 1901, indicate the increasing popularity of the Hereford and Aberdeen Angus breeds amongst the Irish breeders —

In 1891 there were	233 Shorthorns,
	36 Aberdeen Angus,
and	19 Hereford Bulls entered.
In 1901,	387 Shorthorn,
	129 Aberdeen Angus,
and	67 Hereford Bulls were entered.

The number of Irish breeders making entries of animals in the several Herd Books during :—

1895 were	97 entering Shorthorns,
34	„ Aberdeen Angus,
and 9	„ Herefords ;
while in 1900	132 entered Shorthorns,
81	„ Aberdeen Angus,
and 11	„ Herefords.

It is satisfactory to see the increasing number of owners of pure-bred herds, seeing that it may be safely assumed that every such herd is adding to the agricultural wealth of the country.

During the nineteenth century, while efforts were being made in the majority of counties in Ireland to improve the cattle by the introduction of fresh blood and new breeds imported from England and Scotland, few, if any, of these cross-Channel animals were introduced into the mountainous parts of Kerry. Such was the state of matters in 1890, when the Royal Dublin Society, with a view to stimulate improvement of native breeds of cattle, purchased the copyright of a record of the breeding of a small number of Kerry and Dexter Cattle, which had been compiled by the *Farmer's Gazette*, and resolved to publish the "Kerry and Dexter Herd Book." A system of annual inspections was organized, and such animals as were considered eligible by competent judges, together with those qualified by previous entry in the Kerry Register, were accepted for registration.



Dexter Shorthorn Bull.

Nine annual volumes of this publication have been issued. They contain pedigrees and other particulars of 492 bulls and 2,870 cows and heifers of the Kerry breed, and 443 bulls and 1,682 Dexter cows and heifers. The publication of the Herd Book has led to a large number of home breeders in many parts of Ireland being induced to devote increased attention to the matter of selection and systematic breeding, with a view to the improvement of their cattle, while both breeds have, of late years, become popular in many parts of England. It has been a source of regret that there has been, and still is, a disposition on the part of the breeders of Kerry to record such animals only as were meant to be sold, and now, with the restricted conditions of entry for the Herd Book, it is to be feared that many perhaps purely-bred, good animals may fail to qualify for registration through the past neglect of their owners. No doubt, the Department of Agriculture and Technical Instruction for Ireland, through the influence at its command, will be able to bring before the breeders in the remote districts of Kerry the great advantage of care and attention to the breeding and registration of their stock.

The following interesting extracts are from the introduction of Volume I. of the Royal Dublin Society's Herd Book for Kerry and Dexter Cattle:—

Writing in 1807 about the mountainous regions of West Kerry, Isaac Wild says:—

"This country was formerly remarkable for a very small and beautiful breed of black cattle; but the people have been seized with the spirit of improvement, and the true Kerry cow, as it is called, is now rarely to be found, excepting in the mountains in the vicinity of Bantry Bay. The size of this animal does not exceed that of an ordinary yearling calf. From the prevalent inclination of the people to discard the native stock of their hills, it is presumed that they derive more profit from the enlarged breed; but there are some of a contrary opinion, who still maintain their attachment to the ancient race, and who contend that, from their hardy character and the abundance and richness of their milk, they are peculiarly adapted to the situation and circumstances of the country."

"In the early part of the present century, the Royal Dublin Society undertook a general survey of Ireland, for the purpose of developing the industrial resources of the country. The County Kerry was not separately surveyed; but the adjoining County of Cork was surveyed for the Society by the Rev. Horatio Townsend. The author refers frequently in the course of his survey to the partiality of the farmers for the small breed of cattle for dairy purposes. These cattle seem to have been closely related to the Kerries of the present day. Referring to the cattle of Carbery, in the south-west of the county, he says:—

"The cattle of this district, except those possessed by gentlemen, are of a small size, seldom weighing more than three hundred and a-half weight, and frequently not more than two. The breed is now a mixed one, of various colours; formerly they were all black. In the more remote and mountainous parts of the district this colour still predominates; but few, I believe, of the pure native breed at present remain. They are, in general, good milkers—eight pottles or sixteen quarts a day being no uncommon produce from a cow of three hundredweight. The usual price for a new milch cow of this description is from eight to ten

guineas. Small beasts of all kinds are preferred by the farmers, as being better suited to the circumstances of the country, and more capable of enduring hardship, and more easily subsisted."

The views expressed by David Low about Kerries, nearly half a century ago, are of special interest at the present time. He says:—

"These cattle are hardy and capable of subsisting on scanty fare. Although stunted in size when brought from the bogs and sterile pastures on which they are reared, they make a wonderful advance in size, even though several years old, when supplied with suitable food. The fat of their beef is well mixed with the muscular parts, or, in technical language, marbled; and they fatten well in the inside, a character which renders them valuable to the butcher, and distinguishes them in a remarkable degree from the long-horned breeds of the lower country.

"But the peculiar value of the Kerry breed is the adaptation of the females to the purposes of the domestic dairy. In milking properties the Kerry cow, taking size into account, is equal, or superior, to any in the British Islands. It is the large quantity of milk yielded by so small an animal which renders the Kerry cow so generally valued by the cottagers and smaller tenants of Ireland. She is frequently termed the poor man's cow, and she merits this appellation by her capacity of subsisting on such fare as he has means to supply.

"This fine little breed has been greatly neglected; scarce any means have been used to produce a progressive development of form by supplying proper nourishment to the breeding parents and the young, and no general care has been bestowed on preserving the purity of the stock. In almost every part of Ireland, the breed has been crossed with the long-horns; and a great proportion of the cows of the country known under the name of Kerries are the result of crosses of this kind, and have so deviated in a greater or lessor degree from the native type, and almost always for the worse.

"A few honourable exceptions, however, exist to this general neglect of the mountain dairy breed of Ireland. One attempt has succeeded to such a degree as to form a new breed, which partially exists with the characters communicated to it. It has been termed the Dexter breed. It was formed by the late Mr. Dexter, agent to Maude Lord Hawarden. This gentleman is said to have produced his curious breed by selection from the best of the mountain cattle of the district. He communicated to it a remarkable roundness of form and shortness of legs. The steps, however, by which the improvement was effected have not been sufficiently recorded; and some doubt may exist whether the original was the pure Kerry, or some other breed proper to the central parts of Ireland now unknown, or whether some foreign blood, as the Dutch, was not mixed with the native race. One character of the Dexter breed is frequently observed in certain cattle of Ireland, namely, short legs, and a small space from the knee and hock to the hoofs. This has probably given rise to a saying sometimes heard of, "Tipperary beef down to the heels." However the Dexter breed has been formed, it still retains its name and the roundness and depth of carcase which distinguished it. When any individual of a Kerry drove appears remarkably round and short-legged, it is common for the country people to call it a Dexter. . . . The Kerry cows afford admirable first crosses with Shorthorns, Here-



Kerry Cow

fords, and other large breeds. Of these crosses, that with the Short-horns is the most general, and appears to be the best. The crosses are found well adapted to fattening as well as to the dairy; and the profit from this system is so immediate, that it is to be believed that it will be more largely resorted to than a progressive improvement of the parent stock.

"Nevertheless, the cultivation of the pure dairy breed of the Kerry mountains ought not to be neglected by individuals or public associations. The breed is yet the best that is reared over a large extent of country, from its adaptation to the existing state of agriculture and to the humid mountains and bogs in which it is naturalized. Were it to be reared with care in a good district, the form would be gradually more developed, and the Kerry breed might then bear the same relation to the mountain breeds of Ireland that the Castle Martin does to those of Wales, or the West Highland to those of the North of Scotland."*

Kerry cows bear a strong resemblance to the Channel Island cattle in general formation, having a hard, clean-cut head, thin muscular neck, oblique shoulders, narrow crops, and long, thin thighs. Wherever care has been bestowed in a selection and breeding, the udder of the Kerry cow is nicely shaped and the teats well set, indicating great milking capacity, and giving her a right to be termed a typical dairy animal. As a dairy breed Kerries have, no doubt, suffered to some extent from the stringent colour rules as drawn up by breeders and observed by inspectors while admitting foundation stock for the Herd Book. Under these rules white markings on any part of the body other than a small amount on the udders are sufficient to destroy an animal's chance of being accepted as being eligible for registration.

It may justly be questioned if such stringent rules regarding the colour of a breed of cattle, justly valuable as dairy animals, can have any real practical value, while their observance must, in many cases, debar what in other respects may be typical animals, simply because a few white hairs may appear, as they often do, on some other part of the underline beyond the udder. For her size and the quantity of food she consumes, the Kerry cow holds a high position as a dairy animal. In full profit she gives from three and a half to four gallons of rich milk per day, while she will thrive and milk well upon a poor pasture which would be utterly unfit to maintain animals of the so-called improved breeds. Although the Kerry cannot be termed a beef breed the quality of meat of a well-fed animal is exceptionally good, being fine in the grain, the fat and the flesh well mixed, and without that objectionable yellow colour of fat peculiar to Channel Island cattle.

No one interested in cattle could fail to appreciate the many good and striking points of an average specimen of the Dexter breed. There have been many theories regarding the origin of this breed, but nothing definite can be said on the subject. That these cattle owe their diminutive size and great "prepotency" to in-breeding cannot be questioned, and it may be that the great neglect and extreme carelessness of the

* *The Breeds of Domestic Animals of the British Islands.* By David Low. London, 1842. Vol. I.

small farmers in the wilds of Kerry in the matter of fresh blood have led to the production of a type of animal now known as the Dexter.

Crossed with any one of the larger breeds, the "prepotency" of the Dexter is such as to regulate the size and transmit other peculiarities belonging to the Dexter in a remarkable degree. In shape the Dexter differs much from the Kerry, resembling in many points a diminutive Shorthorn. With a short, broad face and nicely set horns, a broad level back, long deep quarters, good flanks, and wide chest, a Dexter in good condition may be termed a perfect specimen of a butcher's animal. While this is so, the milking powers of the ordinary cows of the breed are indeed great. Many of these small animals, not exceeding forty inches in height, give a milk record of four gallons per day, and continue to do so for months after calving.

Being small food consumers, good milkers, and possessed of a quiet, docile disposition, they have been often spoken of as "perfect villa animals." With a wider chest and a stronger constitution than the Jersey, they are gradually displacing the more delicate Channel Island cows in many suburban districts in England.

Their colour may be black or red, with white markings.

"A most interesting and valuable experiment in the matter of cross-breeding, or rather up-grading, has been carried out for many years at Straffan House, County Kildare, Ireland. Some thirty years ago Major

Dexter Crosses. Barton became possessed of a small Dexter cow, and, the animal being a deep milker, her female calf by a pure-bred Shorthorn bull was retained in the herd. From this foundation a small herd of beautifully shaped deep-milking cattle has been bred, and the present-day specimens being the fifth, sixth and seventh generations from the original Dexter cow. The grading-up has been invariably carried out by means of Shorthorn bulls; and while the animals to-day have all the shapes of high-class Shorthorns, they stand very little higher than the foundation Dexter cow. As milking cattle they are, for their size, truly wonderful, several of these small cows giving five gallons of rich milk per day when in full milk."*

* *Food Supply.* Charles Griffin & Co., London, 1898.

SHEEP BREEDING IN IRELAND.

The great September and October fairs of Ballinasloe, the September fair of Banagher, the October fair of Tuam, and the autumn sales in Dublin Market, may be considered the chief centres of the sheep trade of Ireland. At these marts the western breeders display their store sheep, and find purchasers in the graziers of eastern, midland, and southern counties. The system under which the trade is carried on is an interesting division of labour. The western graziers, who own the lighter lands, breed the sheep, and rear them to two and three-year old, and then sell them to the eastern, midland, or southern graziers, either as ewes for breeding purposes, or as wethers to be fattened off. The grass lands of the East, Middle, and South of Ireland are capable of fattening sheep of any age or class—whether lambs or hoggets—ewes or wethers.

Strictly speaking, the big autumn dispersals above referred to are not confined to two and three-year old sheep. They include also lambs and shearlings. The bulk of the sheep sold, however, are two and three-year olds—ewes and wethers, the former—ewes, for breeding purposes—largely predominating. Of the districts immediately around Ballinasloe, the counties Galway, Mayo, and Roscommon furnish much the largest proportion of these store sheep. Smaller drafts come from the County Clare, King's County, and the portion of Westmeath adjoining Connaught; but it is from the flocks kept in the former counties that the majority of the sheep sold in Ballinasloe, Tuam, Banagher, and the Dublin autumn sales are derived. Hence it follows that the district around Ballinasloe, inasmuch as it supplies all the other grazing districts of Ireland with breeding and store sheep, may be said to be the headquarters of the native breed of Irish sheep.

Of these western counties, Roscommon takes the lead in the matter of sheep-breeding. The sheep bred in this county have always been regarded as a distinct type and of superior quality, and they have been so much sought after for the purpose of infusing new blood into the native sheep of the surrounding counties, that the name "Roscommon" is now applied to all the native Irish sheep sold in Ballinasloe and the other centres of the annual autumn dispersals. They are the only native breed which Ireland can claim, and though Roscommon is the birthplace of these sheep, they are now practically distributed all over Ireland. Fundamentally, the type is the same in all these sheep, but they vary as regards size and quality, according to the nature of the pasture and soil on which they are fed, and it must be said that a great deal of mixing and crossing of the breed has in recent years taken place in the South and East of Ireland. Unlike other parts of the country, Roscommon has confined, and still does mainly confine its attention to this breed. For generations, and even centuries, no other sheep have been bred in several districts in the county. In 1895, breeders of Roscommon sheep formed themselves into an association called "The Roscommon Sheep Breeders' Association," with the object of maintaining the purity of the breed, and for the

promotion of its interests generally. They adopted a thorough system of registration and marking. All sheep entered in the Flock Book must be registered and marked with the shamrock perforated in the right ear, which is a trustworthy guarantee of purity. Fixity of type is the key to success in pedigreed stock-breeding, and the establishment of a Flock Book has done much in fixing the type of the Roscommons in every flock, and has enhanced the value of the breed far beyond its native county.

It is held by some authorities that the present breed of Roscommons is the result of crossings of the native Irish sheep with English blood—notably the Leicesters. In 1776, Arthur Young visited Strokestown, and in describing his visit there, says:—"Mr. Mahon's



Roscommon Ewe.

breed, both cattle and sheep, are improved by a bull and a tup, which he bought from Mr. Bakewell, and has bred from them with great success." Later on Youatt says:—"They (*i.e.*, the Roscommon farmers) bred from this valuable selection, and were soon acknowledged to be in possession of a flock of sheep not inferior to that of the most successful English breeder." The first effect of the Leicester cross was a marked decrease of size in the progeny, but this was more than counter-balanced by the enhanced quality, better general conformation, and more early maturing properties which the combination of blood produced.

This crossing with the Leicesters would appear to have taken place previous to 1800, and since then the flockowners in the country have

kept the native breed intact, improving it by judicious blending of the various predominant qualities of the sire with the flock—that is, by taking advantage of all valuable characteristics, encouraging their development, and by degrees rendering them more permanent. This breed, like all classes of stock bred in the West, is kept in a more natural way than other breeds of sheep bred elsewhere, and it is doubtful if they have undergone as much forcing and pampering as the latter, either for the show-ring or the butcher's block.

As stock ewes, the Roscommons are excellent nurses and milkers, and, consequently, their lambs increase very rapidly in size and condition when the flock is not pastured too thickly together. Writing on this breed of sheep in 1895, Mr. Davison, of Esker, Timahoe, Queen's County, says:—"I hope there will be no tampering with the type of those sheep in their native soils, for if this ewe was altered in her present size, milking qualities, and robust constitution, it would be a national loss." Early development has never been claimed for the Roscommons; but like most slow-maturing breeds of sheep, their mutton is of excellent quality, well-grained, and evenly mixed. The leading characteristics of the breed are plenty of size, with a good round rib, strong bone, and fine, long, staple wool. A feature of the Dublin Show last August was the magnificent display made by the Roscommons in the sheep section. The larger proportion of the sheep of this breed exhibited were considered excellent as regards symmetry and general conformation. Amongst the most successful exhibitors was Mr. M. Flanagan, of Tomona, Tulsk, County Roscommon—the efficient and courteous Hon. Sec. of the Roscommon Sheep Breeders' Association—to whom the writer is under many obligations for his kindness in giving him all information as regards the breed.

The Wicklow Cheviots are called after the county of that name, to which they are indigenous. They are much the best class of mountain sheep bred in Ireland, and are akin to the Scotch Cheviot. They are a closely-made, short-legged type, with clean, hardy-looking, bony heads. They are not so slow to fatten as the other mountain breeds, and they carry a better finish and make more weights, and the mutton they produce is of the prime quality. They are especially nice sheep to breed a market lamb when removed to the good grazing districts, and crossed with a pure bred ram—particularly the Shrop. or Oxford Down. For this latter purpose, these sheep are coming into more favour each year; they are excellent nurses and very thrifty to feed, and when judiciously mated with a good Shrop. or Oxford Down ram, and fed in the good grazing districts, they produce lambs of fine size and prime quality. It must be said that the breed is capable of improvement, and that an expenditure in the direction of breeding and feeding would repay the cost.

The mountain sheep of the County Mayo are still more of the Cheviot type than those of the County Wicklow; they are smaller in size, longer in the neck, and much less symmetrical, and are slower to fatten. There are a great many poor animals among these County Mayo mountain sheep, due to their being too much inbred, and not getting proper attention in the matter of feeding, and other respects. The Scotch Hornies predominate in the North of Ireland—in the Counties Down, Tyrone, Armagh, and Londonderry. They vary much in size and quality, and, taken as a whole, the breed is capable of a good deal of improvement. Drafts from these northern mountain

flocks are purchased annually by the Leinster graziers—ewes for crossing with a Shrop. ram to produce market lambs, and wethers and lambs to be fattened off. These latter make the highest class mutton, but they are very slow to fatten when taken off the mountain. The Kerry mountain sheep resemble the Scotch, but are somewhat inferior in size and quality, and they are shorter in the wool.

Of the pure breeds of English sheep there are numerous flocks in Ireland, but these flocks are only of limited extent, and are kept exclusively for the purpose of breeding rams for sale. These rams are usually sold as shearlings, either by public auction at the owner's residence, or at the Dublin autumn sales, or by private sale, either at home or at the fairs. To ensure purity of type in the different flocks, and for the general harmonious working of the trade, an association, called "The Irish Ram Breeding Association," has been formed, and a number of rules laid down to regulate the sale of rams at the annual Dublin auctions. One of these rules states that:—"All sheep for sale must be *bona fide* the property, and have been in the possession of the member of the association in whose name the entry is made for six months prior to date of entry, and must be entered, or the flocks from which they came must be entered, in the respective Flock Books of their breeds.

It is a matter of essential importance with these ram breeders to maintain the purity of their respective flocks, and at the same time not to allow their sheep to degenerate in size, which is a characteristic usually attendant on the continued inbreeding of pure breeds of English sheep in this country. To obviate the latter, drafts of new blood are imported each year, or every alternate year, into the flocks, either from England or from the flocks of noted Irish breeders. Some forty or fifty years ago the Leicesters were the most favoured of the English pure breeds for crossing purposes; but they were found to grow too small, and the mutton they produced was considered too fat, and being open in their fleeces, they were found rather delicate for our moist climate. For all these reasons their breeding was discontinued, so that latterly they would appear to have almost entirely disappeared in Ireland as a pure breed. The Shropshires have taken their place, and of all the English pure breeds they are now the most extensively bred in Ireland, particularly in the good grazing districts, where they are largely used as rams to cross with native Irish ewes, for the production of early market lambs. The other English pure breeds used for ram breeding are the Lincoln, the Border Leicester, the Oxford Down, the South Down, and the Hampshire Down. The rams from the pure English breeds are used by the Irish graziers for crossing with the native ewes, and the Shrop is the most extensively used. The Oxford Down ram is considered an excellent cross with the Mountain or Cheviot ewe, for the production of market lambs, the Border Leicester ram being considered a better cross with these sheep for breeding store lambs, fed on stony mountain or rocky pasture, the latter bred having harder feet to wear than the Shrop. These pure bred flocks are to be found indifferently all through the country—the eastern, midland, and southern counties, where the good grazing lands are placed, being the chief centres of the breeding; while Connaught is an exception, the breeders in that province still holding true in their allegiance to the lordly Roscommon.

The following table shows the number of sheep in each county of Ireland last year:—

No. of SHEEP in each COUNTY, 1900.

County.	Number.	County.	Number.
Antrim,	103,351	Londonderry,	67,321
Armagh,	24,073	Longford,	31,621
Carlow,	97,945	Louth (and County of the Town of Drogheda),	50,009
Cavan,	25,562	Mayo,	361,978
Clare,	117,864	Meath,	234,676
Cork,	320,361	Monaghan,	17,753
Donegal,	194,707	Queen's,	74,182
Down,	122,166	Roscommon,	192,459
Dublin,	69,678	Sligo,	72,572
Fermanagh,	11,942	Tipperary,	251,202
Galway,	653,456	Tyrone,	77,680
Kerry,	137,943	Waterford,	64,504
Kildare,	156,167	Westmeath,	139,613
Kilkenny,	102,283	Wexford,	208,423
King's,	101,730	Wicklow,	228,620
Leitrim,	17,521	Total for all Ireland, ...	4,396,876
Limerick,	58,334		

The following statement gives the number of sheep in Ireland for each year in the period 1880-1900:—

YEAR.	NUMBER.	YEAR.	NUMBER.
1880,	3,562,463	1891,	4,722,613
1881,	3,256,185	1892,	4,827,777
1882,	3,071,755	1893,	4,421,456
1883,	3,219,311	1894,	4,105,180
1884,	3,245,212	1895,	3,913,449
1885,	3,478,056	1896,	4,080,711
1886,	3,366,043	1897,	4,157,906
1887,	3,377,826	1898,	4,287,551
1888,	3,626,069	1899,	4,364,507
1889,	3,789,187	1900,	4,396,876
1890,	4,323,365		

As regards wool, that of the Downs, Shrop, Oxford, South, and Hampshire, is at present the most prized. Good Roscommon hogget comes next, much depending on how the sheep are fed. The wool of Roscommon hoggets, fed in Meath, Westmeath, and neighbouring counties, is worth a halfpenny per lb. above the same class of wool from sheep fed in other districts. Mountain and Cheviot wool are worth about the same price in this country; but in Scotland wool of the same breeds is worth more, as they seem to breed and feed the sheep better in that country. The wool of Cheviots and Mountainies, when fed on the lowlands—Meath, Kildare, &c.—is called "seaside;" the same wool off sheep fed on the mountains is called "Mountain." The Scotch Horny, which is bred in the North of Ireland, produces the lowest grade wool. The Border Leicester and Lincoln wool is considered rather too long and coarse in texture. The wool of aged Roscommon sheep does not vary in price as regards the lands on which they are fed so much as in the case of hoggets of the same breed. Foreign competition is the cause of the decline in the price of wool.

THE SEA FISHERIES OF IRELAND.

I.—HISTORICAL SKETCH.

In times long prior to history the coast inhabitants of Ireland utilized the products of the sea for subsistence, as may be gathered from the examination of so-called kitchen middens, or shell mounds, frequently found close to where oysters, mussels, or cockles abound. The remains of fish are not so readily preserved as are these shells, but it is probable that these primitive people must often have been attracted by the shoals of fish which ever and anon make their appearance, and that they would soon have learnt how to catch them.

The Christian hermits, who in the fifth and sixth centuries settled on remote islands off the coast, must have taken count of the fishing possibilities of their locations, and St. Enda, of the Isles of Arran, definitely refers to the fishermen of Galway Bay. Later on, when large abbeys came to be built, how often do we find that the grey old ruins stand close to a point on a river where a salmon weir exists, or where salmon fishing is profitable. About this time inland fisheries came to be dealt with as valuable property, and in old monastic deeds they are frequently referred to. This value was probably of a very local character, as in those days, when salt was difficult to obtain, and the climate too humid for drying on a large scale, there can have been no great trade in river-caught fish.

The Scandinavians who, for centuries prior to the Anglo-Norman Conquest, occupied the principal coast-towns of Ireland, probably carried on a trade over sea in fish. Their interest in fishing is testified to by the structure of stone fishing weirs, and even their language is still perpetuated in the great "Lax Weir" near Limerick, "*Lax*" being the Danish and Norsk word for salmon. But the earliest references of important sea-fish trade in progress are those dealing with the fishing off the West of Ireland, by Spaniards, in the fifteenth and sixteenth centuries. Philip II. paid £1,000 into the Irish Treasury for permission to fish on the Irish coast; but for how long a time these Spanish fishing boats had made a practice of coming to the coast of Ireland it is difficult to say. In the reign of Queen Elizabeth it was a long-established institution; but, for obvious reasons, after the loss of the great Armada, the Spanish fishing fleets ceased their visits. The extent to which this business was carried on may be judged from a report written to the Queen by Sir Humphrey Gilbert, in which he stated that 600 Spanish fishing vessels were then fishing, and he mentions Baltimore and the Blaskets as centres of the industry; and he also states how the Spaniards complained that their cables were often cut by the natives.

It would appear from this that there was but little sympathy between the Irish and the Spanish visitors, or, perhaps, the temptation of wrecking was too great to allow room for any finer feelings, which, in the absence of education, and of wealth, it might be unreasonable to expect. It is curious how little real history there is of these times; but, besides a stray note, such as the above the impress of the Spanish type on the people in some parts of the West, the legends that hang about the sites of the permanent Spanish fishing establishments, the foundations of a pier still called

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by the people a "Spanish pier," and such like indications, give us some idea of this period of great fishing activity.

In the reign of Charles I. the Dutch were granted a licence to use the Irish fisheries on payment of £30,000, and in 1650 a similar licence was granted to Sweden.

In the 17th century among the chief fishers of the Irish coast were the French. Fishing vessels from Yarmouth also came thither, looking for cod, ling, and herrings, and English merchants cured thousands of barrels of herrings on the coasts from Wexford to Kinsale, for export to the Continent.

One of many places where the French established themselves was Portrush, now famous for its golf links:—"The Bretons came every season thither for dogfish and rays, which, being well handled, are a very great commodity in Spain, especially in the Condado. The rays, likewise, sell well in the river of Nantes." Rays are still a commodity at Portrush and Portstewart, but the taste for dogfish awaits revival.

On the whole, these were, for fishermen, troubled times, as "pecharoons," or pirates, continuously infested the coast, making their headquarters at Leamcon, in West Cork; while in time of war the Dutch fleets held command of the seas, and Anglo-Irish merchants wrote in vain to the English Government for protection of convoys, which the King was unable to give.

As far back as the fifth year of Edward IV. attempts were made to profit by this foreign fishing by putting a tax of 13s. 4d. on every foreign fishing vessel of over six tons, or large enough to carry a small boat, and 2s. for every boat less than that size that visited the Irish coast. These were small craft to come from foreign ports; but the terms of the Act points to their having done so. "An office was erected" for the collection of these dues; but Queen Elizabeth conferred the right of collecting them on a friend, and an intelligent leaseholder, under this title, in the following reign, attempted to exact the tax from English vessels, which naturally led to an outcry on their part. They appealed to the King, who thereupon ruled that the law should not apply to any of His Majesty's subjects.

During intervals of peace the Hollanders strengthened their position on the coasts of Ireland, and went so far as to attempt the purchase of the port of Galway. The price said to have been offered was as many coins as, placed side by side, would cover the quays. The King accepted the offer, provided the coins were placed on edge. This terminated the negotiations. With more congenial excitements, such as Tyrone's Rebellion and Civil War, it seemed difficult to get the Irish to interest themselves in fishing; but no doubt "the trade," so well understood by the foreigners, and by the English, which enabled them to turn the products of the fishery into money value, was quite unknown to the native Irish. The want of business instincts so often bemoaned in Ireland was then far greater than in our time, while the Hollanders were the most skilful traders that the world has ever produced.

About 1625 the Lord Deputy appears to have visited Mayo, and conceived the idea of developing the fishing industry there by applying for "a patent for thirty years to some forty gentlemen willing to undergo the charge of fishing, and to have a grant of the district from Achill to the Stagges of Broadhaven. They doubt not they will build fair towns, and employ large numbers of people to the benefit of the British Isles." The projectors of this scheme

calculated that they would, in four years, have 20,000 people employed. "The Hollanders return home to repack, and, perhaps, they may be retarded by foul weather, in which they cannot fish, while they, the projectors, will not need to sail four leagues out of the harbours before they apply themselves to fishing. This fishing borders on the County of Mayo, the inhabitants the most barbarous and dangerous in all Ireland."

History is silent as regards the civilizing and pacifying efforts of these forty gentlemen, nor does it say how far they took the gains from the Dutch, nor whether it led to any important development of industry in Blacksod Bay.

Schemes to suppress foreign fishing continued, and in 1667 an Act was passed against importing fish taken by foreigners. Times, however, again changed: England's policy was influenced by the desire to develop the Newfoundland fisheries, and bounties were actually paid on the importation of fish, caught and cured there, into Ireland.

With the opening of the century which has just closed we come to a period when development and decline of the Irish fisheries follow one another in rapid succession, when the conditions under which they were carried on were profoundly affected by outside circumstances, and it is only by glancing at these circumstances that the fluctuations can be understood.

In the sixteenth century the potato was introduced into Ireland, and, as is generally understood, was planted by Sir Walter Raleigh in the South of Ireland, on the banks of the Blackwater. Up to that period the Irish peasants appear to have been a flesh-eating people. They lived, as contemporary writers tell us, on the produce of their flocks and herds. Campion, writing expressively, if not elegantly, in 1571, says that "oxmale and butter they crame together. They drink whey, milke, and beef broth. Flesh they devour without bread. Corne, such as they have, they give to their horses." He further says they "swill in aquavitæ by quarts and pottles." With such a complete *menu*, varied in some places by an abundance of salmon, sea-fishing was an unnecessary employment, and could not have been attractive to a population mainly pastoral. This, I think, accounts for the sea fisheries being left in the hands of Spaniards or Dutchmen, who were encouraged by an over-sea demand for the products of the Irish fisheries.

For a long time the potato was only cultivated as a garden product, as a delicacy for the few; not until the eighteenth century did it become the food of the people. The population of Ireland, then about three and a-half millions, sprang up by leaps and bounds, until, in 1840, it was over eight millions. The "butter, beef broth and flesh" were now a thing of the past. Such living might have been possible for three millions people, when cattle were not turned into money by a cross-channel trade; but it was clearly impossible for the potato-eating millions which had come into existence. All the resources of the country had now to be drawn on, and, as fish and potatoes go well together, the Irish sea fisheries began for the first time to be worked with vigour by the native population. In the early days of the nineteenth century, bounties, as in Scotland, were offered in Ireland to encourage the building of a good class of fishing vessel, and the prosecution of the fisheries. Connected with this bounty system there were, unfortunately, many frauds; but from one cause or another fine fleets of fishing-boats sailed from the Irish harbours, and a hardy race of men formed their crews.

Cod, ling, hake, and herrings were caught and cured for the local demand, and to add to the other causes of prosperity, herrings visited the coast at this time in immense numbers.

After two or three premonitory symptoms the awful crash of the great famine came in 1846. The potato crop failed. Thousands of people died of starvation and disease resulting from it. Thousands more emigrated, and, during the ten following years, the population dropped from over eight millions to five millions.

In the reports of the Fishery Commissioners for the years after the famine we note the decline of the fishing fleets. The old order of things had changed, and until the new came in we see the vain efforts of philanthropic people and of the Government to better matters. These efforts were futile, because a great tide in the affairs of men was setting against them and there was no stemming it.

While these tragedies, profoundly affecting the Irish people, were being enacted, problems of an entirely different class were being worked out elsewhere. Folks of those days might have found it hard to imagine that matters, mostly scientific, could have any practical bearing on the Irish fisheries, and yet it was out of such experiments and discoveries that the new developments were to arise. George Stevenson, in these days, was trying to adapt steam to railways; while Bell and Symington were planning the first steamers. The electric telegraph followed in due course, and the latter half of the nineteenth century saw fresh sea fish delivered everywhere—fish packed in ice was sold in towns and localities where nothing but salt or smoked fish was seen before. It saw special fish trains, special steamers—steam on land and steam on sea—used in the carrying as well as in the catching—ice factories driven by steam, and the wants of millions provided for and arranged by telegraph. With all these facilities the demand for fresh fish increased by rapid bounds, and the Irish fisheries, for a time lost to sight, were once more looked to for a supply. Irish herrings were sought for by fishing boats, and in some years not in vain; but the herring was not on the coast in the quantities of former days. Herrings are fickle fish: they come for years and go for years, and are not always forthcoming where the best reception has been prepared. One year, however, while fishing for herring, the Manx men at Kinsale reported that there was an abundance of mackerel—fine plump mackerel—on those south coasts, 2½ lbs. weight. The herring nets were cast aside, ice provided instead of salt, fast steamers engaged, many others built for the service, and in three years from the first venture “the great Spring Mackerel Fishery” was established. Boat-building then boomed in the Isle of Man; boats from Arklow, Co. Down, Campelton, Lowestoft, Cornwall, and France flocked to Kinsale, so that on one day as many as 700 splendid first-class boats, which, with nets, would be worth over £600 a piece, have been seen in that harbour. As the years passed the boats began to work more to the westward. Owing to the munificence of the Baroness Burdett-Coutts the Cape Clear fishermen got mackerel boats, and Baltimore became a centre to which some of the buyers moved on. Then part of the fleet wandered on and made Berehaven a centre, then Valentia, Smerwick, Fenit, and the Shannon were reached. Smerwick and the Shannon were soon abandoned as inconvenient, and for years Kinsale, Baltimore, Berehaven, and Valentia were the chief centres of the industry. All this time a local fleet was growing up along the coast, the boats being obtained on Government loans, until at last the

number of Irish boats exceeded that of all the visitors put together. In 1890, the Royal Dublin Society began to investigate the seas off Galway and Mayo, and in 1892 the establishment of the Spring Mackerel Fishery at the Aran Islands by the Congested Districts Board opened up new possibilities, and these remote parts of the coast as far as the North of Mayo are now rapidly developing new centres of the trade.



Canvas Canoes or *Currachs* at Brandon, Co. Kerry.

II.—FISHING GROUNDS.

The Atlantic sends in its shoals of mackerel with fair regularity twice every year. Herrings, too, appear in varying numbers. Pilchards used to come, but not for many years, and, unfortunately, dog-fish follow the pellyssi-fish in millions. The fishing grounds around Ireland produce sole, turbot, plaice, cod, ling, haak, haddock, conger, and ray, with a sprinkling of halibut, and in the deeper waters tusk. Owing to the contour of the submarine plateau on which Ireland stands, these fishing grounds on the western side of the Island extend to only a short distance from shore, whereas on the south, north, and east they extend as far as boats can go. The water which bathes the Irish shores is brought thither by the great drift from the ocean known as the Gulf Stream, and, being replete with living organisms, an abundance of food is always coming in from outside the fishing area. While an immense area is thus available for these fishes within the depth limits at which their existence is possible, it is a very common mistake to think that fish are equally distributed over it. For certain reasons, only partially understood, these various classes of fish have their favourite haunts. In one region, at a certain season, haak arrive in great numbers, at another plaice or sole; in one place ling predominate, in another cod or haddock, but between these haunts lines may be set with most tempting bait, or trawls shot, and the takes

be worthless. The stock of fish, therefore, in the fishable area is thus often over-estimated, and calculations made where area is taken into account may be quite erroneous.

On the Western Prairies at one time herds of buffalo roamed, which reasonable men held to be interminable, and yet in one short year modern weapons and an organised attack swept them off the face of the earth.

The difficulty of getting at the herds of fish is greater than in the case of the buffalo. Their numbers, too, are vastly greater, and consequently they may stand line fishing, with its many delays and its desultory attacks, for ages to come, as they have done in the past; but when the modern steam trawler, knowing the season when fish crowd into very limited haunts, gets at these grounds with his persistence and effective gear, it is not a too prejudiced view to take when we say that an exterminating hunt has begun. A good deal of the line fishing grounds around Ireland have thus been invaded, but within the areas where line fishing is safe and possible, there is still room for very considerable development.

Ray and conger have in Ireland generally been treated more or less as worthless, or only fit to bait lobster pots, but nowadays the fishermen have been taught that, when got across channel fresh, there is more trade in them than in cod and ling.

In the development of line-fishing, the bait difficulty is very great, and provision to meet it calls for further organisation.

THE SPRING MACKEREL FISHERY.

In the early days of the spring mackerel fishing, the fish were generally expected to appear off the South-west coast about the 17th of March. Of late years they are rarely caught by the large boats before the first or second week of April, and the fishing closes about the middle of June.

Stormy weather frequently prevails in April, thus reducing what is under any circumstances a short season to one which leaves little time to pay expenses and make a profit.

The expenses, in all directions, are heavy. The merchants must lay in immense stores of ice and of boxes, and keep expensive steamers in waiting. The fishermen have their long trains of nets to prepare, nets useless except for this one venture, and in many cases the boats' crews count on this reason alone to give them any profit above what is necessary for the weekly support of their families.

The fleets of large deep-sea fishing vessels which congregate on the South-west of Ireland, have recently been made up in about the following proportions:—

Irish 350, Manx 160, English and Scotch 50, and French 70,

while on the coasts of Galway and Mayo there are about 75 large boats owned and fished locally. All these vessels use drift nets, forming trains of from one and a-half to two miles in length, and many of them have steam capstans for hauling in their gear. The value of the boat and her outfit varies from about £300 to £600.

The mackerel nets are shallower than herring nets: 6 score of 3-inch meshes deep being about the standard size, and they are set at the surface, carrying the boat with them as they drift with the tide.

A great number of row boats and canvas canoes join in the spring mackerel fishery, and they usually get the fish close to shore, before the larger vessels capture them in the offing. After a short time the

fishing moves off seaward, and the small boats, which have secured the high prices of the early fishing, are then compelled to give it up.

The largest vessels which join in the spring fishing are those from France. They carry longer trains of nets, much larger crews, and salt the mackerel on board until they have a full cargo, when they sail for home.

THE AUTUMN MACKEREL FISHERY.

The spring mackerel fishery lasts, as we have seen, for about two months, and is mainly a large-boat fishery. The autumn fishery, which begins in the end of August, often lasts on, when weather permits, into the winter, and up to Christmas. It is a row-boat and canoe fishery, the fish as a rule lying too close to the coast for large boats to approach them with safety. It is also wide spread in its distribution, almost every creek from the South of Cork to the North of Mayo taking part in it. On the South-west coast the fishery opens with seine fishing, and in September the seines, with which often immense hauls have been made, are discarded for gill nets. These gill or meshing nets are sometimes drifted on in other districts, anchored out at sundown, and visited during the night or in the early morning. The fish are then taken in hand by the curers. They are split, washed, salt rubbed in, and packed, an abundance of water for washing determining the site of the curing station, as it also does to a great extent the quality of the cure. When the final packing takes place, 210 lbs. of fish are carefully weighed out for each barrel, which is then filled up with clear pickle, and the weight of fish guaranteed by a brand on the outside. Crushing of barrels, and consequent leakage of pickle during the voyage to America, is one of the difficulties the trade has to contend with.

COD AND LING.

Cod and ling frequent the coast in considerable numbers, and from almost every creek where fishing boats can be kept men proceed to neighbouring "banks" or grounds where, from the nature of the bottom and the presence of suitable food, these fish congregate during the winter and spring.

The fishing is carried on by means of long lines, and the success of the industry depends largely on the supply of bait.

The difficulty of obtaining herring bait is one of the greatest that besets this fishery, and the consequence is that the men who could only obtain ling worm or mussel bait, took to using very small hooks on their lines, thus hoping that small haddock or whiting would take the hook, and in turn be swallowed by a cod or a ling. In the reorganisation of the fisheries, the matters of first importance to inculcate have been the procuring of proper bait, and the use of large hooks, such as are used on the great lines in the North Sea, together with a great extension of the lines. On some portions of the coast there is a considerable local sale for the catch, but on the West coast the difficulty and expense of quick transit makes it frequently more profitable to cure the fish, and at the stations opened by the Congested Districts Board this curing is done according to the most approved methods.

HERRING FISHING.

The policy adopted by king herring, in his treatment of the Irish coast, has been most aggravating, as he has shown a fickleness quite

different from his course of action on the Scottish coast. The only explanation is that Ireland being, as it were, the South-western outpost of his territory, it has not always been necessary to maintain a concentration of his forces in that direction. Not being admitted to his councils, we can do no more than feel the great inconvenience of herrings turning up in their thousands at one place for five, ten, or twenty years, and then taking themselves off for half a century. The buildings prepared for their reception fall into ruin, and these dilapidated, roofless stores adorning some of our ports, the grass-grown quays, and the hulls of boats cast aside to rot, are the only monuments that remain of days when the herring fishery was in full swing, and the now half-deserted wharves a scene of bustling industry. All the same, it is better for herrings to come in force occasionally than not to come at all, and they are always, to a certain extent, with us.

Herrings turn up in April off Kinsale, on the coast of Cork, and are in May only fished for by large herring boats, which come for this particular venture from the East coast of Scotland; all the large Irish boats at this time being engaged in the spring mackerel fishing. This is a wholly "freshing" business, the fish being despatched quickly by rail or fast steamers to market. Later on in the season herrings appear farther to the eastward, and in July there has been in some years a heavy fishing on the East coast off Howth, and about thirty years ago that part of the Irish sea between Dublin, the Isle of Man, and Ardglass, in the county of Down, was the scene of a herring fishing, to which boats congregated from all parts of the United Kingdom, and large earnings were made. Whether the shoals of herrings which appear off the South coast in April or May, and those upon which this autumn fishery depended, are in any way related, has frequently been the subject of warm discussion, and in the present state of our knowledge it is wise to express no opinion. For a great many years the herring fishery in this part of the Irish sea has failed, although recently it gives promise of revival.

Turning to the North and West coasts, we have to go back from 60 to 70 years to find a great herring fishery. At that time Burton Port and Killybegs, in Donegal, Roundstone, in Connemara, and several ports on the West and South-west were scenes of stirring trade. Then the herrings vanished, and the revival on the Donegal coast, in the Rosses and Sheephaven, goes back for only eight years or less. Now it is big enough to attract the consideration of well-known curing firms, chiefly from Scotland, and it is a strange anomaly of trade to see fast steamers daily starting for Glasgow with Irish herrings, both cured and fresh, and at the very same time fish merchants in Ireland importing barrels of herrings in large numbers from Scotland. The herrings of the West of Ireland are of a very high class, and have taken top prices in the North German market.

Besides the revival of herring fishing on the Donegal coast, West Mayo is coming under its influence; while in Galway Bay, and other large bays which seem to have their own peculiar herring fisheries, good seasons as bad ones have come and gone, while far greater fluctuations have characterised the fishing on the outer coast. Constancy, however, is unfortunately conspicuous by its absence from the Irish herring fisheries.

TRAWLING.

Trawling has been practised on the Irish coast certainly for a century, and it is difficult to say for how long before. The most primitive

form is the pole trawl, still used on the South coast. In this case the net consists of a bag and wings, the latter being kept distended by poles projecting from each side of the hooker to which the ends of the warps are attached. In large hookers the spread given by the poles is about fifty feet, but the distance apart of the "hammers" or weights at the ends of the wings of the net, could not, in ten fathoms of water, be more than 25 feet, and in deeper water much less. About 35 years ago otters came into general use, giving a much greater spread to the net, but poles in the larger boats are used as well. On the coasts of Ulster the otters approved of are larger in proportion to the size of the boats, and poles are unnecessary. In Dublin, Galway, and Dingle there are fleets of beam trawl boats varying from 40 to 70 tons, many of them being purchased in Brixham, Lowestoft, or Grimsby, and a few steam trawlers are also owned in Ireland.

The greater part of the Irish sea is a trawling ground, and is more or less a sheltered area. Soles and plaice migrate within it according to season, and are followed to their favourite haunts by the sailing trawlers from Dublin, Liverpool, and the Isle of Man. Spells of calms and of storms gave the fish a chance of rest, the number of days in the year that trawlers could be on their treck being comparatively few. Now the whole business is changed, and the steam trawlers ceaselessly prowl to and fro—no calm can stop them, and only exceptionally severe storms. The steam fleets are growing, the demand for fresh fish appears to be increasing, the business is a thriving one, and the only question is—how long can it last? The returns of fish landed at the great fish ports of Grimsby, Hull, Aberdeen, Liverpool, and Milford show big figures, and a casual glance has led many to the conclusion that the fishing grounds of the United Kingdom are bearing the strain fairly well; but closer examination shows that these returns are kept up by hosts of steamers arriving from the coast of Ireland (for which Irish statistics show nothing), from Iceland, Faroe, the Bay of Biscay, and the coast of Holland, the areas fished being a hundred times greater than they were 50 years ago.

To the South and North of Ireland are great areas good for trawling, but exposed to the Atlantic swell, and in the West of Ireland are particularly rich grounds, but of small extent, on account of the rapid deepening of the ocean in that direction.

Fish in paying quantities for the steamers, and in some cases for the sailers, are still to be found in all these grounds; but in the Irish sea the stock of fish, particularly of soles, is declining, and it is difficult to believe that in the ultimate interest of the steam trawling industry itself, as well as that of the public at large, it is not desirable to have protected areas where fish, whose numbers are limited, may have sanctuary, and an opportunity to propagate their kind.

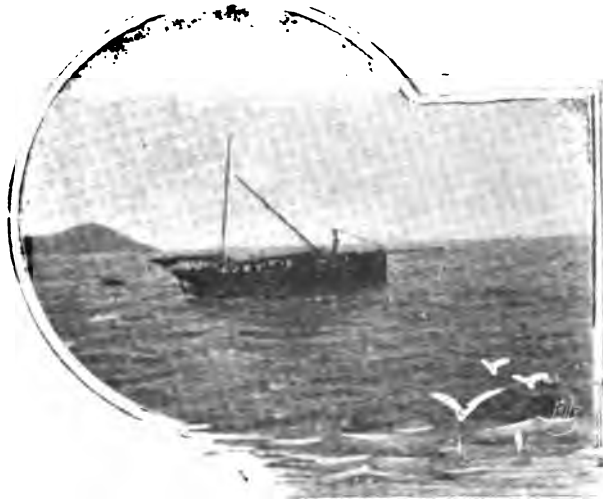
OTHER FISHERIES.

Lobsters are found in considerable numbers wherever the coast is rocky, and at certain places firms have made ponds for storing them.

Oysters occur in the sea off the coast, and on the much-indented West coast there have been famous oyster beds. Some are still worked, but there appears to be room for effort in the direction of restoration of stock where the natural beds are absolutely free from pollution.

Mussels in some districts are largely exported, but for want of means of despatch, fine beds are in some places unworked.

A very large quantity of perriwinkles are exported to England, and, to a very small extent, a prawn fishery is carried on.



French Mackerel Boat sheltering on Kerry Coast.

III.—TYPES OF IRISH FISHING BOATS.

THE fishing boats to be found around the Irish coast are of a variety of types. Some are relics of bygone times, and survive because they possess those qualities which make them specially suitable for the work they have to do. Others are of new types, introduced from England, Scotland, and Norway, and provide for the requirements of the new and more elaborate modes of fishing.

The boats in use in all countries are more or less the result of evolution going on for ages, and the type is determined by its environment. The class of fishing vessel most suitable on one part of the coast may be quite unsuitable on another. When, therefore, the physical conditions and market facilities have been ignored, attempts to introduce new methods of fishing have resulted in failure.

In the days when saws were unknown, planks were not easy to make, and primitive man, when he wanted to get afloat, had to do one of two things: he had either to make a canoe by scooping out a solid log, or else to construct a framework of branches of trees and cover it with raw hide. The early Irish, being a pastoral people, found hides ready to hand, and consequently they constructed for sea use the Curragh or Canoe. When canvas came within their reach it afforded a still better covering, and it stimulated further development.

There are many places on the west coast of Ireland where the great Atlantic rollers break in such volume and fury that it does not do merely to haul a boat up clear of the water, and leave her there. Boats, to be safe, must be placed high above the sea level. The light and buoyant canvas curragh has, amongst others, this great advantage: that when the men come in from fishing they need not go looking for help, but simply turn their canoe over their heads and walk up the rocky path or over the boulder beach, and place her in a safe nook where no angry billow can harm her. The lightness and buoyancy of the canvas canoe is unsurpassed, and,

consequently, on those parts of the coast where these qualities are of the first importance, the canoe still holds its own. In some places the primitive one-man canoe lingers, but in most districts the curragh has developed into a shapely canoe for four men. And as they are designed to go over the water rather than through it they are, when properly handled, safe in the most stormy sea, and can face a surf where any wooden boat would be swamped. On the Kerry coast the canoe has reached its highest development.

The Pookawn of the Connemara coast also represents an early type of craft. This coast, on account of its extraordinary indentations and channels safe from the ocean, is the natural home of the sailing boat. Here the necessity for hauling up does not exist, and deep sail boats, from the hooker of twenty tons to the pookawn of three, may be found stowed away in creeks close to the cottages of the owners. The pookawn, or the glothogue (a small hooker), take the place filled by the donkey and cart in districts not so cut up by arms of the sea. The peat is taken to market, the weed gathered for kelp, or for manure, by these boats; in them, also, the supplies of flour and meal arrive, the cattle go to the fair, and the people to Mass. The youngsters quickly become sailors, and for excitement, smart sailing, and close contest, nothing can beat a pookawn race at one of the local regattas. All these craft—hookers, glothogues, and pookawns—are built on exquisitely graceful lines under water, but the "tumble home" above water and the immense strength of their frames tends to give them a clumsy appearance. The rig of the pookawn is a high-peaked dipping lug, with a peak halyard to support the outer end of the yard, and a jib. This lug-sail is evidently a modified lateen, the peak halyard testifying to the alterations made in or after the seventeenth century, when jibs were invented; therefore it seems as though the pookawn is a relic of Spanish influence, the sails in other parts of the British Islands being chiefly referable to the Scandinavian type. In the Mediterranean the modified lateen of the pookawn may frequently be seen.

Glothogues and hookers are rigged in the ordinary smack or cutter rig of the present day. The sails of all these craft are made of strong calico soaked in a composition of tar and butter, and when freshly coated are almost black.

The clever boatwrights of this Connemara shore took quickly to the new models presented to them by the Congested Districts Board, and, with little instruction, after being taught the necessity of bending planks by steam, have turned out Nobbies and Zulus as well as the best.

The managers of the Industrial Schools of Killybegs and Baltimore have also established building yards to meet the demand awakened by the opening up of new centres of fishing.

Leaving the Connemara coast for Donegal, we meet with a good class of four-oared yawl, pointed at both ends, of great beam, and easy to manage under two spritsails and a jib. They are generally known by the herring fishers and line men all along the north coast as "Greencastle yawls"; but at Greencastle and its neighbourhood, the point from which the type has radiated, they are called "Drontheim Boats," indicating clearly enough that they have been introduced from Norway.

In West Cork and Kerry a long narrow six-oared boat has become prevalent, great speed being required for working the large mackerel seines.

At the mouth of the Shannon the salmon fishers of the Cashen

river have adopted a highly specialized class of surf boat. The heavy Atlantic swell breaking on the bar frequently renders ingress or egress for any ordinary boat impossible, but these boats with flat floor amidships, and sheered up to five feet off the ground at either end, can make the passage when nothing else could.

On the flat shores of Wexford flat double-keeled boats are used; but in the rest of Ireland the boats employed are for the most part the antiquated hooker, but more generally the modern trawler or herring boat, or ketch-rigged mackerel boat similar to those in use in other parts of the United Kingdom.

With so many types of boat in use it is possible that some one may ask—why cannot some type be found to be less special, and consequently more generally useful? Some dependence of the type on physical features has already been pointed out; but there is one more point. Taking boats of large size alone, some are wanted for drift net fishing, others for line fishing, and others for trawling, according as the facilities for following any of these fishings predominate. And it often becomes a most delicate calculation to find out what qualities should, with a view to profit, be aimed at. The diversity of requirements between an ideal mackerel boat and a trawler may thus be stated in illustration: a mackerel boat, besides needing good sea-going qualities, which she must have in common with a trawler, must be constructed to carry a bulky load of nets and of fish, and to put the minimum strain on her gear when in the water. A trawler, on the contrary, must be constructed to put the maximum strain on her gear, and carrying capacity for her is of little importance. Generally speaking the qualities desired are as numerous as the types of craft in use.



Arklow Mackerel Fleet.

IV.—DEPARTMENTAL MARINE LABORATORY.— EQUIPMENT FOR FISHERIES INVESTIGATIONS.

Although Ireland can show a long and honourable record of work in the field of marine biology, it is only within comparatively recent years that the practical utility of such work in connection with the administration and development of our fisheries has received public recognition.

The first step in this direction was the organisation in 1890 and 1891 by the Royal Dublin Society of a survey of the fishing grounds on the west coast. For this purpose a steam yacht was chartered in each of the years mentioned, and was equipped for all descriptions of fishing operations, and for biological and physical observations. The grounds were surveyed in as thorough a manner as possible, and the results carefully recorded.

Towards the expenses of the survey Her Majesty's Treasury contributed a sum equal to half of the estimated cost; but as the estimate was considerably exceeded, much more than half the actual cost was defrayed by the Society. One of the Inspectors of Irish Fisheries acted as director of the survey, and other gentlemen were employed in the capacity of naturalists and physicists.

At the time of the survey there were practically no fisheries of importance on the west coast, and the great development which has since taken place may be attributed in large measure to the information which was obtained by the survey.

In 1898 the Royal Dublin Society once more entered the field of fisheries research, and, having obtained from Her Majesty's Treasury a grant of money equal to half the proposed cost, proceeded to establish a Marine Laboratory for the purpose of studying, for a period of five years, the various problems affecting the mackerel fishery and the proceedings of salmon in the sea. The laboratory commenced work in February, 1899.

Its management, subject to the control of a Joint Committee in regard to the branches of research mentioned above, has since been handed over to the Fisheries Branch of the Department of Agriculture.

As the field of observation was not intended to be confined to one particular district, it was essential that the laboratory should be capable of being moved from one place to another. Frame houses fulfil this condition, but are understood to be generally more easy to take to pieces than to put together again. Moreover, in the case of any building on land, fresh difficulty and expense in regard of site and supply of sea water would have arisen whenever the *locus* was changed.

A floating structure is free of these disadvantages, and, if moored in sheltered water, is almost always sufficiently stable for the use of delicate scientific instruments.

The Fisheries Department of the Danish Government have for some years used a floating laboratory, chiefly, if not entirely, within the fjords. It is a specially constructed floating house. In Scotland trial was made of a much smaller structure of a similar kind, but, possibly



Two Views of the Interior of the Marine Laboratory of the Department of Agriculture and Technical Instruction for Ireland.

from want of care in the selection of a site for mooring, the experiment was not considered a success, although no similar difficulty appears to have been encountered by the Danish investigators.

Considerations both of sea worthiness and economy suggested the conversion of a sea-going ship into a laboratory, and the Society accordingly purchased the brigantine *Saturn*, of Galway, of about 220 gross tonnage.

To ensure the maximum of stability when at anchor, it was necessary to sacrifice all means of locomotion by removing all overhead gear, except the lower fore-mast, which was required to take a derrick.

The hold was floored throughout, and divided by a partition into two apartments. The larger of these, about 35 feet by 20 feet, was fitted as a laboratory, with four tables for workers, and a large central table, ledged and covered with sheet lead, for aquaria. Overhead light is obtained from a skylight, which occupies the whole of the main hatch, while each worker's table is lighted by a window cut in the ship's side.

Sea water for the aquaria is led by a pipe, fitted with a series of cocks, from a reservoir on deck, which is filled by means of a semi-rotary hand pump, the waste water draining by a pipe into the bilge. The wall space of the laboratory is occupied by bookcases, cupboards, and shelves for jars, bottles, &c.

The other division of the hold is fitted as a state-room for the scientific staff. A deck-house, erected aft of the pumps, serves as a dining-room, and is also found convenient for the recording of the routine meteorological observations.

The cuddy, which, as is usual on ships of similar size, is of rather limited dimensions, is used as a store-room, while the captain's cabin has been converted into a photographic dark room.

The crew occupy the fore-castle, which has not been altered in any way.

While the laboratory serves as headquarters, fishing operations are carried on by a number of boats. The largest of these is the *Monica*, a nobby-rigged mackerel boat, thirty-six feet on the keel. She carries a train of forty nets, and, in addition to the usual accommodation for the fishing crew, has a small state-room, with two bunks and cupboards and lockers for the scientific instruments. She carries a small punt.

The *Marion*, a sloop-rigged, half-decked boat of twenty-two feet l.o.a., the *Conger* and *Mule*, open boats, with standing lug-sails, and a small nameless dinghey, complete the flotilla.

The Laboratory has hitherto been moored at Ballynakill in the winter, and Inisbofin in the summer, being towed from one place to the other by the steamers of the Congested Districts Board.

These sites were selected on account of their proximity to Cleggan, which is the headquarters of one of the principal mackerel fisheries of the country. They have also been found convenient for the study of the movements and habits of the salmonidæ in salt water.

In regard to both mackerel and salmonidæ, observations have been made continuously, while the hardly less important study of the general fauna has been by no means neglected.

The equipment of the Fisheries Branch of the Department for scientific research is efficiently completed by the steam cruiser *Helga*,

a twin-screw steamer of 375 tons. She is a boat of excellent sea-going qualities, and capable of maintaining a high rate of speed, while her low free board renders her most suitable for fishing operations.

For her duties in patrolling the waters closed to trawling, and in generally enforcing the provisions of bye-laws relating to sea fisheries, she has special fittings, with which we are not here concerned.

For the purposes of scientific investigation of the fishing grounds, she is completely equipped as a trawler, carrying a number of trawls of different patterns, the largest having a beam of forty-one feet. Her winch has two barrels, one holding a stout warp for trawling at moderate depths, the other being occupied by a fine warp for use with lighter gear at great depths. She is also provided with dredges and tow-nets, including self-closing nets for use at different depths, a deep-sea sounding apparatus, and all necessary instruments for physical and microscopical observation.



Falls of the Shannon, near Castleconnel.

INLAND FISHERIES.

The inland fisheries include the Salmon fishery, though this is largely carried on at sea, and appear to be worth, in pecuniary return, rather more than the sea fisheries. The Salmon fishery is by far the most valuable, its annual return being estimated, even in the present somewhat depressed condition, at £300,000, while the number of professional fishermen employed in it appears to be about 12,000 or 13,000, a number which, with their families, constitutes a respectable proportion of the entire population.

The commercial Salmon fishery is prosecuted, as may be supposed, chiefly at or near the mouths of rivers, the engines most used being draft-nets or seines (790 in 1899) and drift-nets (362 in 1899). Fixed engines, such as weirs, bag-nets and stake-nets, being restricted by statute, are comparatively few in number, but in some cases of great value. Snap-nets (242 in 1899) are confined to the Waterford, Lismore, Limerick, and Drogheda, districts.

In Ireland, under common law, the public have the right of fishing for Salmon with moving nets in the sea and in the estuaries at any place more than half a mile above or below the defined mouth of a river, except where several fisheries have been granted by charter, and it follows that professional fishermen have a very substantial interest in the industry. In some places, where a several fishery exists, fishermen net on their own account under license from the owner, and probably in every case of a private net-fishery the employes receive a certain sum for every fish caught in addition to whatever may be their regular wage.

The greater proportion of the drift-nets are in the hands of fishermen of the poorest class, who also hold most of the snap-nets and a large proportion of the draft-nets. In consequence the number of these nets which are used fluctuates considerably from year to year in proportion with the success of the fishery and the prospect of enough being earned to leave a margin of profit after payment of the license duty.

It would be difficult to attempt to localise the commercial Salmon fishery, since it is prosecuted with more or less success on all parts of the coast, but the mouths of the Shannon, Corrib, Erne, Foyle, Bann, Boyne, Nore, Suir, Barrow, and Blackwater may be cited as among the most important centres.

Sea Trout, always called White Trout in Ireland, are of considerable commercial value to the country, the chief fisheries being on the west coast. Brown Trout, including the large varieties found in certain lakes, and the Slob Trout or "luogues" of estuaries are also

netted for market in a good many places, while the Pollen fishery engages the attention of many of the inhabitants of the shores of Lough Neagh. The Eel fishery is prosecuted chiefly by means of weirs and is of great commercial value. The Shannon, Bann, Erne, and Corrib are important rivers in this connection.

Angling can hardly be regarded as of great value from the commercial point of view, though a large proportion of Salmon and White Trout caught by rod and line find their way to market, and there are a number of professional anglers who fish solely for commercial purposes.

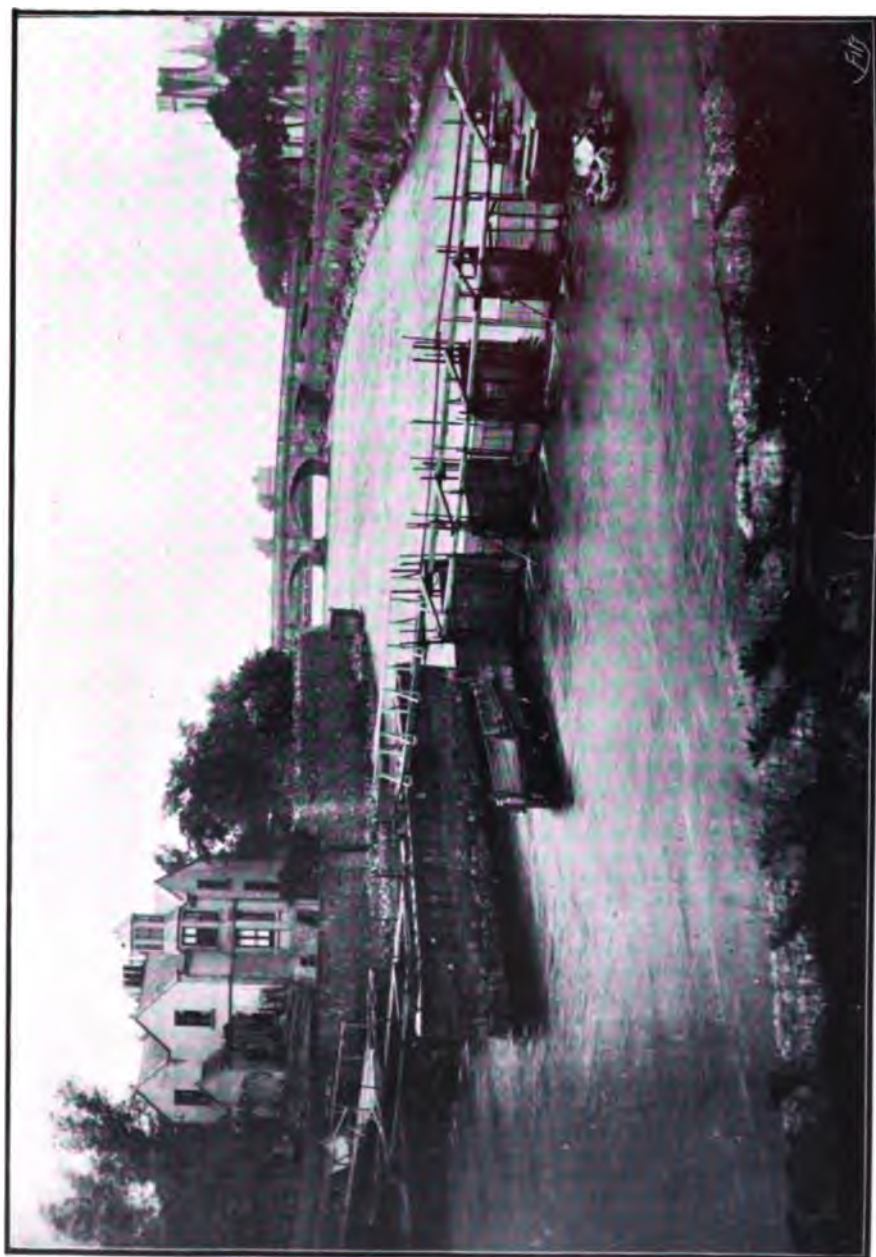
As a sport, angling is of the greatest importance to the country, since nowhere else in the three kingdoms can the sportsman obtain such good angling at so small an outlay. Famous fisheries of course command high rents, but almost every river holds Salmon, and in the remoter parts of the country good sport can often be obtained at no charge beyond the very moderate bill of the hotel which has leased the fishery. The complaints, so frequent in past years, that the excellence of the fishing was marred by the uninhabitable nature of the hotels has no longer much justification in fact, existing hotels having been improved and new ones having sprung up in all directions. Moreover during the present season there is every sign that the recent comparative scarcity of Salmon is a thing of the past. The rivers, of course, vary in their season and in the quality of fish which they hold, and while a man may hope to land a forty pounder in the Shannon he need expect nothing but "peal" (grilse) in many of the smaller rivers. In the summer the White Trout angling is excellent and accessible to the most moderate purse in many rivers and lakes in the West. Brown Trout are in every lake and stream, and leave to fish for them may usually be had for the asking, where they happen to be preserved at all. In the larger lakes they grow to a great size and give proportionate sport. No licence is required for Brown Trout angling, a licence of £1 being payable for Salmon or White Trout angling and applying to the whole country.

Char are to be found in several lakes, but are little troubled by anglers.

Unfortunately those who are interested in Pike need have no difficulty in finding them, and there is a substratum of truth as to the size of Irish Pike quite sufficient to support a considerable edifice of piscatorial romance, though it may not be every day that one catches a monster in whose mouth "the spoon-baits are jangling like the bells of Armagh cathedral."

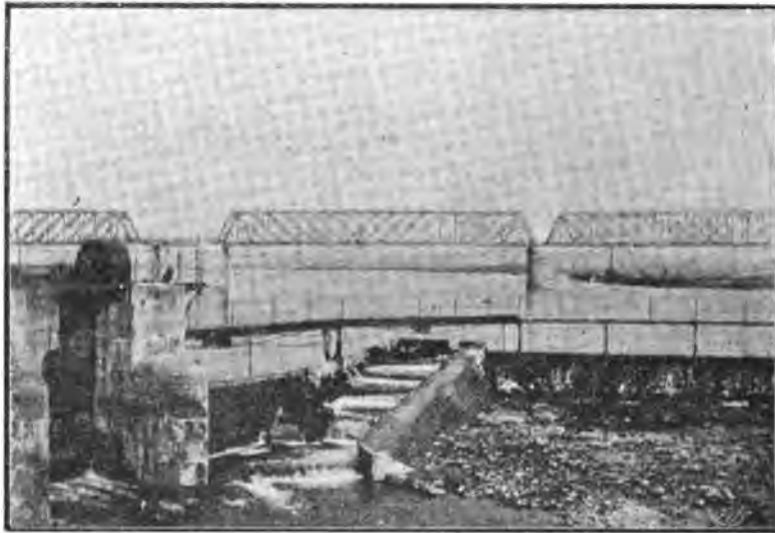
ARTIFICIAL PROPAGATION.

The artificial propagation of Salmon is carried on at a number of hatcheries, of which fourteen are on a fairly large scale, and the hatching of White and Brown Trout is not altogether neglected. The hatcheries vary a good deal in structure, from the elaborate modern establishments on the Bann, Boyne, and Foyle, to the somewhat primitive but quite efficient open air hatcheries of Kerry.



The Salmon Weir at Galway.

Formerly these hatcheries relied for support entirely upon the enterprise of private individuals, but during the last spawning season, the department, recognising the public value of the Salmon fishery, offered a subsidy in respect of any increase on the output of fry in previous years. This offer was accepted in a number of instances, and the output consequently shows a considerable increase. It would have been much larger but for the fact that floods greatly interfered with the capture of stud fish.



Salmon Pass, Galway.

THE LINEN TRADE OF IRELAND.*

The manufacture of linen is admittedly, after agriculture, the most important industry in Ireland, although it is practically confined to the North-eastern corner of the country. The growth of the trade is shown by the fact that Belfast—the headquarters of the industry—has grown from a small town of 8,000 inhabitants in 1757, into a great city, with an estimated population of 350,000. The textile industries flourished at different times in Ireland, especially the manufacture of woollen goods, until they were discouraged by the protective legislation of England two centuries ago. It is estimated that during the reign of Charles I. the exports of woollen goods amounted to £110,000 annually, and of linen goods to about £10,000. Silk weaving was once extensively carried on, but it gradually decayed, chiefly on account of strikes and trade restrictions, and now this industry is practically limited to poplin making. The manufacture of linen had been encouraged by Strafford, but it was not until the Huguenot refugees settled in Ireland that this industry became really developed.† Louis Crommelin, one of these refugees, who had settled in Holland, and there obtained great celebrity as an expert in the manufacture of linen, was induced by William III. to emigrate to Ireland, in order to supervise the industry there. Crommelin selected Lisnagarvey (now Lisburn) as the headquarters of the trade, and as his brothers and other relatives and friends followed him, there was soon a small Huguenot colony there. Crommelin introduced into Ireland the spinning wheel, and was appointed "Overseer of the Royal Linen Manufacture of Ireland." In 1707 he received the formal thanks of the Irish Parliament for his exertions in promoting this industry, of which, indeed, he was the real founder.

In 1711 the Linen Board was appointed to encourage and, to a certain extent, control the flax and hempen manufactures of Ireland. The Board met every week in the White Linen Hall in Dublin, now the Linenhall Barracks, and was entrusted, until its dissolution in 1828, with the distribution of Parliamentary grants, which varied from £10,000 to £33,000 a year. The exports of linen from Ireland in 1690 were estimated at 300,000 yards, and had increased in 1720 to 2,400,000 yards, valued at £100,000. The returns kept by the Linen Board from 1728 to 1821 show how enormously the export trade developed. In 1728 there were 4,692,764 yards of plain linen exported; in less than twenty years the figures were doubled, and in 1821 there were 43,507,928 yards exported. The application of machinery, and the system of wet spinning, which was introduced into Ireland in 1828,

* This article should be read in conjunction with that on "The Flax Supply Association," pp. 127-134.

† It is interesting to note that whilst these refugees were improving the linen trade in Ireland Irish emigrants were rendering a similar service for the woollen trade on the continent. The Catholics went to France and to the northern part of Spain "where they laid the foundation of a manufacture highly prejudicial to England," and the Protestants went to Germany and parts of France. These Irish emigrants, both Catholics and Protestants, are said to have so much improved the woollen manufactures of France as not only to supply themselves, but even to vie with the English in their foreign markets. See *The Trade of Ireland*, an interesting essay published by a Mr. Arthur Dobbs in 1728.

practically revolutionised the industry. The whole linen trade received a great impetus at the time of the Civil War in America, through the disruption of the cotton manufacture, but this abnormal expansion was soon followed by a serious decline, from the effects of which the industry suffered for a long time, and it was years before the trade regained its normal condition.

The following figures* indicate the extent of the linen manufacture in Ireland at present :—

SPINNING MILLS.				POWER-LOOM FACTORIES.	
Years.	Spindles employed.	Spindles unemployed.	Total Spindles.	Years.	Looms employed.
1879-83,	798,006	38,160	836,160	1878,	20,958
1882,	853,106	20,183	873,242	1879,	20,633
1883,	816,334	58,454	874,788	1882,	21,779
1884,	816,334	50,454	866,788	1833,	23,676
1885,	810,456	63,454	873,910	1885,	24,300
1886,	808,036	70,754	873,780	1886,	24,300
1887,	803,036	40,534	843,590	1887,	25,300
1888,	808,036	27,564	830,590	1888,	25,000
1889,	827,451	7,456	830,907	1889,	26,360
1890,	815,685	11,766	827,451	1890,	26,592
1891,	827,451	-	827,451	1891,	26,592
1892,	837,642	9,000	846,642	1892,	28,233
1893,	837,642	9,000	846,642	1893,	28,233
1894,	846,642	-	846,642	1894,	28,733
1895,	846,642	-	846,642	1895,	28,764
1896,	846,642	-	846,642	1896,	29,000
1897,	869,056	-	869,056	1897,	31,484
1898,	846,100	-	846,100	1898,	31,484
1899,	835,100	-	835,100	1899,	31,484
1900,	835,100	-	835,100	1900,	31,484

Most of the flax used now is imported, though formerly a very large quantity was produced in Ireland. In 1860 there were 128,595 acres under this crop, and in 1864 the area so cultivated was increased to over 300,000 acres, in consequence of the impetus given to the linen trade by the scarcity of cotton, but this increase was followed by an immediate reaction, which has since continued, despite the fact that the moist, mild climate of Ireland is well suited for flax-growing. The area under this crop reached its lowest level in 1898, when flax was grown on only 34,469 acres. In the following year, however, there was an increase of 520 acres under this crop, and in 1900 the area had increased to 47,451 acres. The diminution in the supply of the raw material has been attributed, amongst other causes, to the large supply of cheap fibre from Russia, the better quality of the Belgian fibre, and the consequent unremunerative return to the farmer for the cultivation of the crop in Ireland. The linen industry of Belfast and the surrounding district thrives well, but its supply of raw flax fibre is chiefly Continental.

The Department of Agriculture and Technical Instruction is this

* These figures are taken from the Belfast and Province of Ulster Directory for 1901, which contains much valuable information upon the subject.

year conducting experiments in the kind of soil and the manures best suited for the flax plant. These two essentials in the successful growth of flax have not always received the attention required. The system of retting, or rotting, in dug-out ponds, is primitive, and is the same as the inferior "blue" system in Belgium. Double-retting in a slowly running river, as carried to perfection in Belgium, at Courtrai, in the river Lys, is nowhere practised (legally) in Ireland. With the discovery of the retting bacterium, and the conditions of its life, by Winogradsky, it is hoped that some artificial system of retting may be commercially possible ultimately. The valuable manures contained in the retting water, and the flax seeds, so useful as sources of oil, oil cake, and manure, are at present generally lost in Ireland. An inquiry, instituted by the Department in 1900, showed that, as a rule, the flax seed imported (very little home-grown is used), is fairly pure and of good germinating power, but that it is inferior in weight, indicating that the seed imported is not allowed to ripen fully in the field, but is the seed taken from the flax plants when the fibre is at its best for textile purposes, and before the plants and their seeds are quite ripe.



Fig 1.—Venetian Needle-Point, Seventeenth Century.
Museum of Science and Art, Dublin.

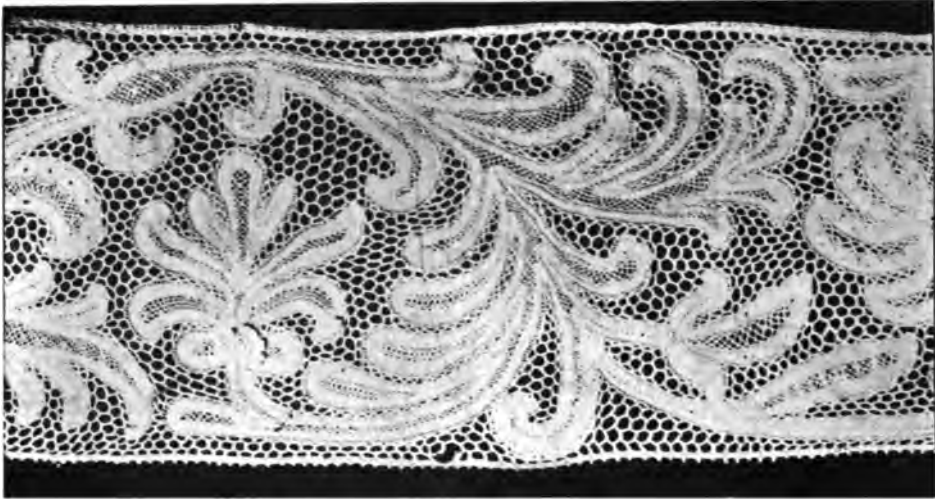


Fig. 2.—Genoise Pillow Lace, Seventeenth Century.
Museum of Science and Art, Dublin.



Fig. 3.—Gros Point de Venise, Seventeenth Century.
Museum of Science and Art, Dublin.

THE MODERN IRISH LACE INDUSTRY.

LACE, from the antiquarian point of view, has furnished a subject for some learned treatises; but I rather desire to speak of the various laces which are at present made in Ireland, and shall only refer to antique examples where it is necessary to illustrate varieties of lace, or show differences which exist between the Irish lace and that from which it may be said to have been derived.

True lace may be divided into two classes, one made by means of the needle, and called "needle-point lace."

Fig. 1 is from a piece of Italian (Venetian) needle-point lace of the seventeenth century. The pattern is floral,

Needle-point Lace. and very simple in its character. The lace has that peculiar flatness which is observable in the Venetian needle-point laces. Note the fine ground which has been made altogether by means of the needle. The open work contrasts with this ground, and, in addition to forming the edge, is carried at intervals across the lace. There is a very effective hexagonal filling occurring chiefly at the edge; it is used sparingly however, and affords a good example of the restraint exercised by the old lace-makers.

The other class of lace is made by the twisting or plaiting of threads; it is known as "pillow lace," or

Pillow Lace.

sometimes "bobbin lace," from the fact that the threads are twined round small bobbins of bone, wood, or ivory. In both of these laces the whole of the fabric is made by hand. This is not the case in the so-called Limerick and Carrickmacross laces.

Fig. 2 is from a piece of Italian-Genoese pillow lace of the seventeenth century. The pattern consists of a flowing scroll with conventional flowers and leaves. It is very even in its workmanship, and has peculiar raised portions in some of the flowers. It is not cut up by the insertion of many fillings, and the pattern is relieved clearly and effectively against the ground.

The needle-point lace is at present commonly subdivided into two classes, flat and raised needle-point; and although there is a considerable difference in the appearance of the two, yet both are made in the same way, that is, by means of the needle, the raised appearance in the latter being obtained by working over cords of varying thickness.

The growth of lace-making can be distinctly traced from its origin in embroidered linen. At first, portions of the linen were cut away, leaving the embroidery. Threads were also drawn from the linen, and in the spaces so formed needlework was inserted. In order to avoid the trouble of withdrawing the threads, an open reticulated ground was made called "laci," and upon this ground little devices were worked. All these varieties were found in use at the opening of the sixteenth century. The linen, as a basis, was gradually dispensed with, and the tooth-shaped borders (*dentelles*) came on the scene as the first appearance of true lace.

Thus from these small beginnings were gradually evolved in response

to the demands of fashion the wonderful productions of the seventeenth and eighteenth centuries.

I trust my lady readers will pardon me for saying that it has been noted as a curious fact that lace showed little artistic character until men adopted the fashion of wearing it. It was for the great noble and the prelate that the magnificent specimens of "Point de Venise" were made in the seventeenth century. We read that a collar made for Louis XIV. at Venice cost £60, a large sum of money at that time. The fashions in those days changed as surely though rather more slowly than in our own time; and the heavy laces were gradually supplanted by the laces having meshed grounds. As men wore less, women wore more of them, and so laces of lighter texture were sought after. The heavy Venetian points gave place to the lighter "rose point." In France such laces as the "Points d'Alençon" and "d'Argentan" and many other subordinate varieties rose into a position of importance.

Fig. 3 is from a fine specimen of Gros Point de Venise of the seventeenth century. It is only a small portion of the collar; the design is composed of fine, bold forms peculiar to this description of lace. The raised portions give an effect of richness; the closeness and solidity of the work are remarkable. The fine diapers and patterns formed by small holes on the flowers and leaves are worthy of notice, as well as the delicate cresting which surrounds some of the forms. There are very few "brides" or "ties"; the ornament is so designed that its forms mainly support each other.

Fig. 4 is also a piece of needle-point lace, Venetian, seventeenth century. It is probably a little later in period than the preceding specimen. The forms have become smaller, and more delicate, and consequently many more brides or ties are required to hold them in position. The workmanship is of the choicest; and it is possible that the greatest triumphs of the needle, so far as craft is concerned, have been attained in this description of lace. From the numbers of little crestings which surround the forms, suggesting the shape of frost or snow crystals, this lace has frequently been called 'Point de Neige. At the right side of the figure it may be noticed that the pattern is constructed on a vertical line and is symmetrical, from thence branching off into scrolls which play over the surface. These symmetrical portions occur at regular intervals.

Flanders had almost always restricted herself to the manufacture of pillow lace. It seems to have been introduced from Italy about 1536, and so engaged the attention of the Flemings that they were soon recognized as the chief producers of this lace. At the present time the lace-makers of Bruges, in common with those at many other places in Belgium, may be seen busily engaged in the production of pillow lace.

Fig. 5 represents a piece of Brussels pillow lace of the eighteenth century. The pattern is floral, composed of sprays which intertwine with the meander which separates the two grounds. There are also small detached sprays. This contrast of a fine with a coarser ground is very effective, and may be seen in the earlier French needle-point laces. It is well to note how sparingly the fillings are used in all these antique laces.

Fig 6 represents a border of Mechlin lace, of possibly an early date. The forms are large, and rather clumsily drawn. The pattern would seem to have been made for an insertion rather than a trimming border, as the ornament does not form the edge.

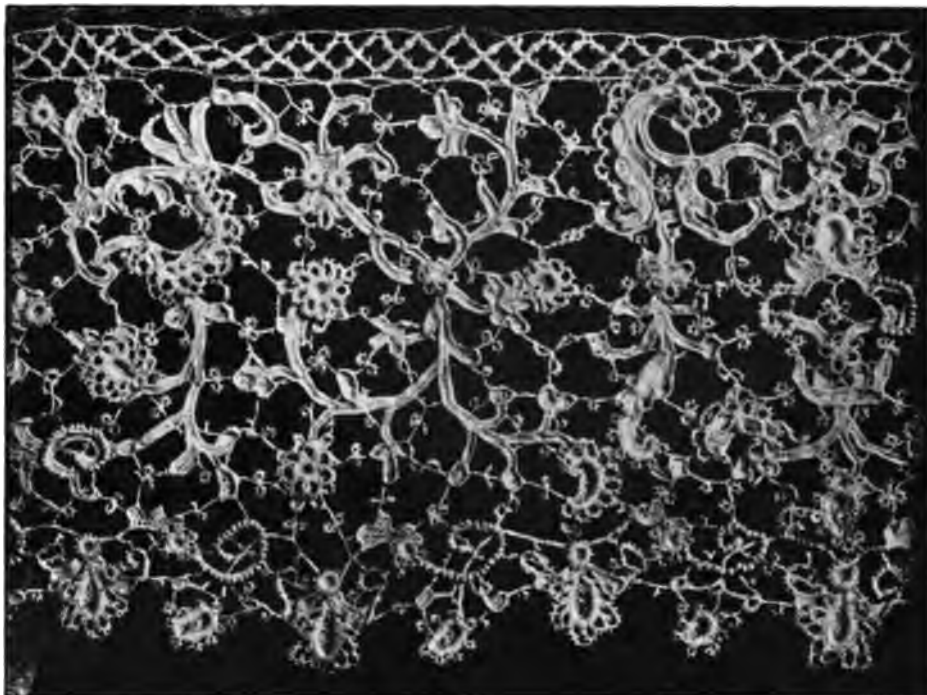


Fig. 4.—“Snow-Point,” Venetian, Seventeenth Century.
Museum of Science and Art, Dublin.



Fig. 5.—Brussels Pillow Lace, Eighteenth Century.
Museum of Science and Art, Dublin.



Fig. 6.—Mechlin Pillow Lace.
Museum of Science and Art, Dublin.



Fig. 7.—Old Flat Point.
Presentation Convent, Youghal.

It may be of some interest to describe briefly the method of making lace. In needle-point lace the pattern is carefully drawn upon a piece of glazed calico, parchment, or paper; the former is commonly used in the present day. This is laid upon a piece of calico and the pattern is carefully outlined or "traced," as it is termed by the worker with a thread; this thread is the framework or skeleton on which the lace is made. When the work is completed, the lace is released from the calico by cutting with a sharp knife between the two pieces. In large pieces of work considerable skill is required in so cutting up the patterns into different pieces, to be made by different workers, that they can be easily joined together in such a manner as not to exhibit the line of junction. In some of the meshed hexagonal grounds of modern French lace this is done in a truly surprising manner, not the least appearance of a joining being visible.

In pillow lace the pattern is drawn (preferably) on a piece of parchment. It is then pricked over by an expert, and placed upon the cushion; in each of the holes a fine pin is inserted, and upon the pins the threads are plaited and twisted by means of the hands; the various methods of twisting and the arrangement of the holes resulting in the varieties of grounds and fillings. Children commence to learn pillow lace-making in Belgium at the age of five years.

In the year 1883 the Cork Exhibition was held, and I had the honour of a seat on the Executive Committee of that undertaking. As part of my duty, I went to South Kensington to ask for a loan collection from the Museum. In conversation with General, now Sir John Donnelly, K.C.B., he mentioned the fact that Mr. Alan S. Cole intended paying a visit to Limerick in the summer of that year, and delivering two lectures on lace-making, and suggested that it might be an advantage if Cork had the opportunity of hearing these lectures also. I promised to bring the matter before the Committee on my return. On doing so, they heartily agreed with the suggestion, and Mr. Cole was invited to deliver two lectures on lace-making in the Exhibition building. Lace, embroidery, plain and fancy needlework formed an important section of the Exhibition, and almost all the convents in the South of Ireland were exhibitors. I proposed to Mr. Cole that we should have a walk through the Lace Section of the Exhibition. We noticed the excellence of the work, so far as the use of the needle was concerned, and found it combined with poverty of design and very bad drawing. The result of our conversation was that an effort should be made to improve the character of the design and the quality of the drawing; and as a commencement it was decided that a letter should be sent to the convents which had exhibited, asking them whether they would be willing to grant an interview to Mr. Cole and myself in order that we might have a talk about the necessity which existed for such an improvement, and if they thought well of it, that some arrangement might be made by which the convents should form classes for instruction in drawing and design.

In the early spring of 1884 visits were made to several convents which had replied favourably, and in conjunction with Mr. Cole I submitted a scheme to the Department by which I might commence a course of instruction to these convent classes. It was to be a system of peripatetic teaching, if I may so call it. I was well aware that in many, if not all the convents, there were ladies who had received a certain

amount of art education, which only wanted direction in order to produce good results ; and knowing this I proposed the formation of classes which should be taught by certain of the Sisters, who would themselves commence a course of study which would enable them to qualify for the Art Class Teacher's Certificate. I was to visit each class once a month, inspect the work done by pupils and nuns, lecture, give directions as to the work for the ensuing month, and generally guide their efforts.

The course of study which I adopted was as follows :—During the first year they should practice freehand drawing from the flat, and geometrical drawing ; 2nd year, model drawing, ornament from the cast, and the practice of making working drawings from photographs of antique lace, correcting the form when necessary ; 3rd year, drawing plant form from nature, and designing patterns. The Science and Art Department approved of this scheme, and the first class was commenced at the Convent of Mercy, Kinsale, followed immediately by a class at the Convent of Poor Clares, Kenmare. Before two years had elapsed there were classes in operation at Killarney, Tralee, Youghal, Thurles, Skibbereen, and St. Vincent's and Blackrock Convents, Cork. My idea was that a class of designers should be formed in each centre, with the work-room in close proximity, so that it would be possible to make trial pieces from the designs. This is absolutely necessary in order to judge of the effect of a piece of lace. I have been informed by M. Lefebure, the great lace manufacturer in Paris, that he has sometimes had as many as five trial pieces made from a design before the result could be considered satisfactory. This ideal of mine was realized in some instances, notably at Kenmare and Kinsale.

The Committee of the Cork Exhibition gave a sum of £200, and the Science and Art Department an equal amount, for the purchase of good specimens of antique lace ; and thus a small but valuable collection was formed. In order to make this available to the classes, I arranged a system of circulation by which each Convent had a frame containing one or more pieces of lace on loan for a month, and thus they had an opportunity of studying from the entire collection.

Before the commencement of the Convent Classes we had endeavoured to form a small class of designers at the School of Art, Cork, with the object of supplying designs for lace and crotchet to those centres which were not sufficiently advanced to make their own designs. I selected a few of the advanced students, and set them to copy from the lace in the loan collection which hung in the Exhibition ; at the same time they made themselves acquainted with the technicality of lace-making, and the limitations of the material, by, in several cases, actually learning how to make the lace for which they were designing. It is scarcely necessary for me to remark that it is, in my opinion, absolutely impossible for any student, no matter how clever he may be, to make successful designs without fully comprehending the limitations of the material in which the design is to be carried out. I have several times had to combat an idea which is entertained by some ; that is, if a large class of artisans is taught drawing, it is possible to make them all proficient at design. Like the poet, a good designer cannot be made. A notable instance occurs to me. I remember two ladies, sisters, who had studied together ; both drew equally well from the cast and from nature, and had passed through all the elementary work creditably. They informed me that

Difficulties in Lace Designing.

William J. H. G.
Department of Agriculture
and
Technical Instruction for Ireland.

IRELAND:
Industrial and Agricultural.

Handbook
for
THE IRISH PAVILION,
Glasgow International Exhibition,
1901.



DUBLIN,
1901.

culty in forming the edge, leaves have been inserted which do not grow from any stem, and in two places the edge is actually formed by the ground. It looks as if the separate portions had been taken from different designs, and put together on the paper in a perfectly haphazard fashion, and, indeed, this is the way in which many such designs were made. Novelty was obtained by sometimes borrowing a spray or two from an old wall paper and inserting them into the body of the design. Again, look at the drawing of the forms, leaves of various kinds grow from the one stem, worm-like forms are introduced, and fillings are inserted without any proper idea of their value. The ground is without regularity. In fact, the whole design shows the debasement of form in a most complete manner, and illustrates what really took place in days gone by, when designs were traced again and again on tissue paper, by those who had never learned to draw, until the original form was lost, and a medley of meaningless shapes, such as you see before you, was the result.

Fig. 8.—Now turn to this specimen of modern flat needle-point from the same place. The lace is used to trim a handkerchief, which is a square. The border is wide in relation to the handkerchief, but that is in consequence of the dictates of fashion; sometimes the borders are very narrow, sometimes wide. You can at once see that there is construction in this design, the corners are symmetrical, and are formed on the diagonals of the square, as centre lines, while the diameters of the square again bisect the forms, which appear in the centre of each side. I say nothing as to the talent of the designer, but here is evidence that thought has been at work. There is a mixture of conventional with natural forms, which has been well managed, one contrasting with the other, and the eye is carried pleasantly round the border, with sufficient accent on the places where centre lines would occur. The effect gained by running the leaves with the cambric is good, as it helps to unite the border with the centre of the handkerchief. The little arch-like arrangement of flowers in the centre of each side is well conceived, as it leads the eye from the edge, at the corners of the handkerchief, up into the centre, and then down to the opposite corner, thus giving a pleasing line. The forms are well drawn, the curves are true, the fillings are perhaps a little too freely used, but the ground is very much more regular than in the last example. After a study of these two patterns, I am sure you will agree with me that there is some value in good drawing and design, and that it is not without reason so much has been said as to the necessity for both.

Fig. 9 is also an example of the improvement which has taken place in the designs for Youghal lace. This is a cuff of slightly raised needle-point; the forms are accentuated by the raised outline which adds brightness to the lace. The design is good; and one can see at a glance that there is no haphazard throwing together of the forms in this instance, but that the whole arrangement has been carefully thought out. Observe that although the general arrangement is symmetrical the severity of such an arrangement has been mitigated by the leaf which crosses the centre line, and hides the curve at the end of one of the cornucopiæ. The forms are well drawn, the small enrichments on the surfaces of the leaves and flowers are managed with judgment, and the bars or ties are well arranged, and sufficiently enriched with picots. On the whole, I consider this specimen fit to rank with many of the antique laces, both as regards workmanship and design.

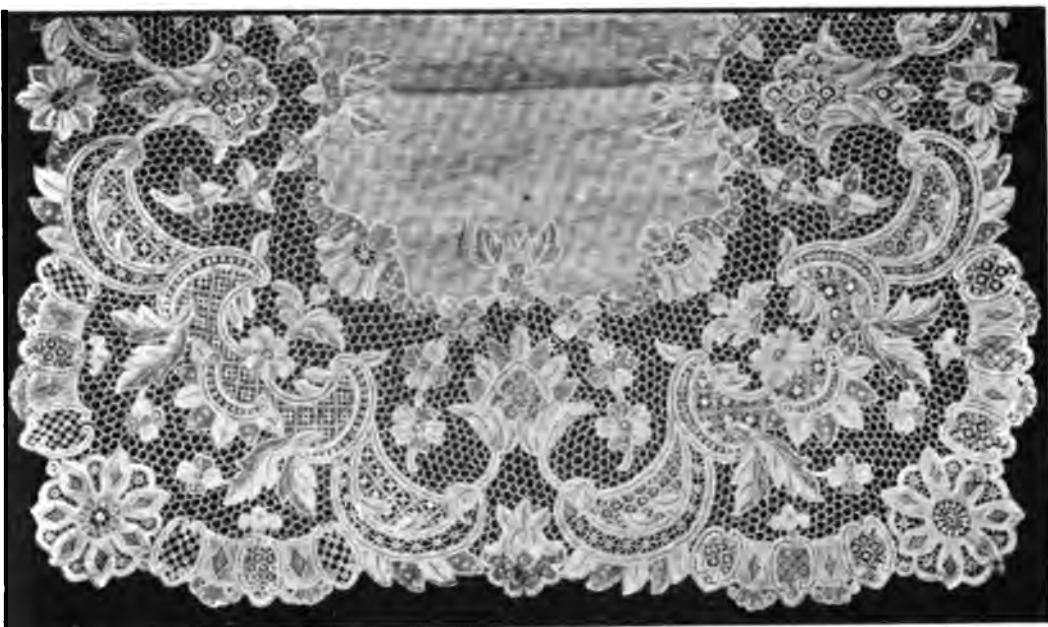


Fig. 8.—Modern Flat Point, Presentation Convent, Youghal.



Fig. 9.—Modern Raised Needlepoint, Youghal.



Fig. 10.—Modern Flat Needlepoint, Convent of Poor Clares, Kenmare.

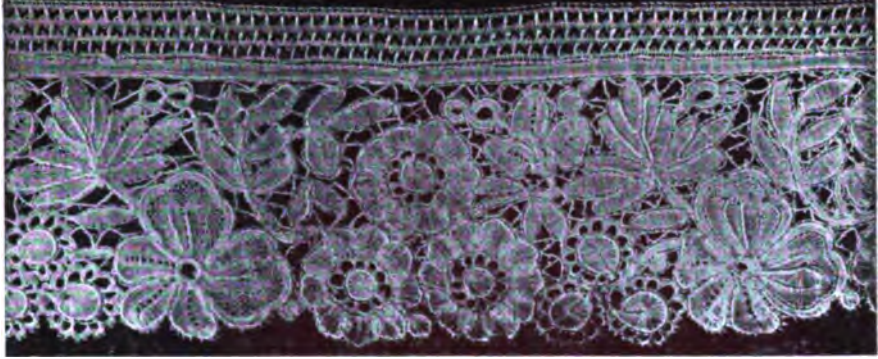


Fig. 11.—Birr Pillow Lace.



Fig. 12.—Old Limerick Tambour Lace.



Fig. 13.—Modern Limerick Tambour Lace.

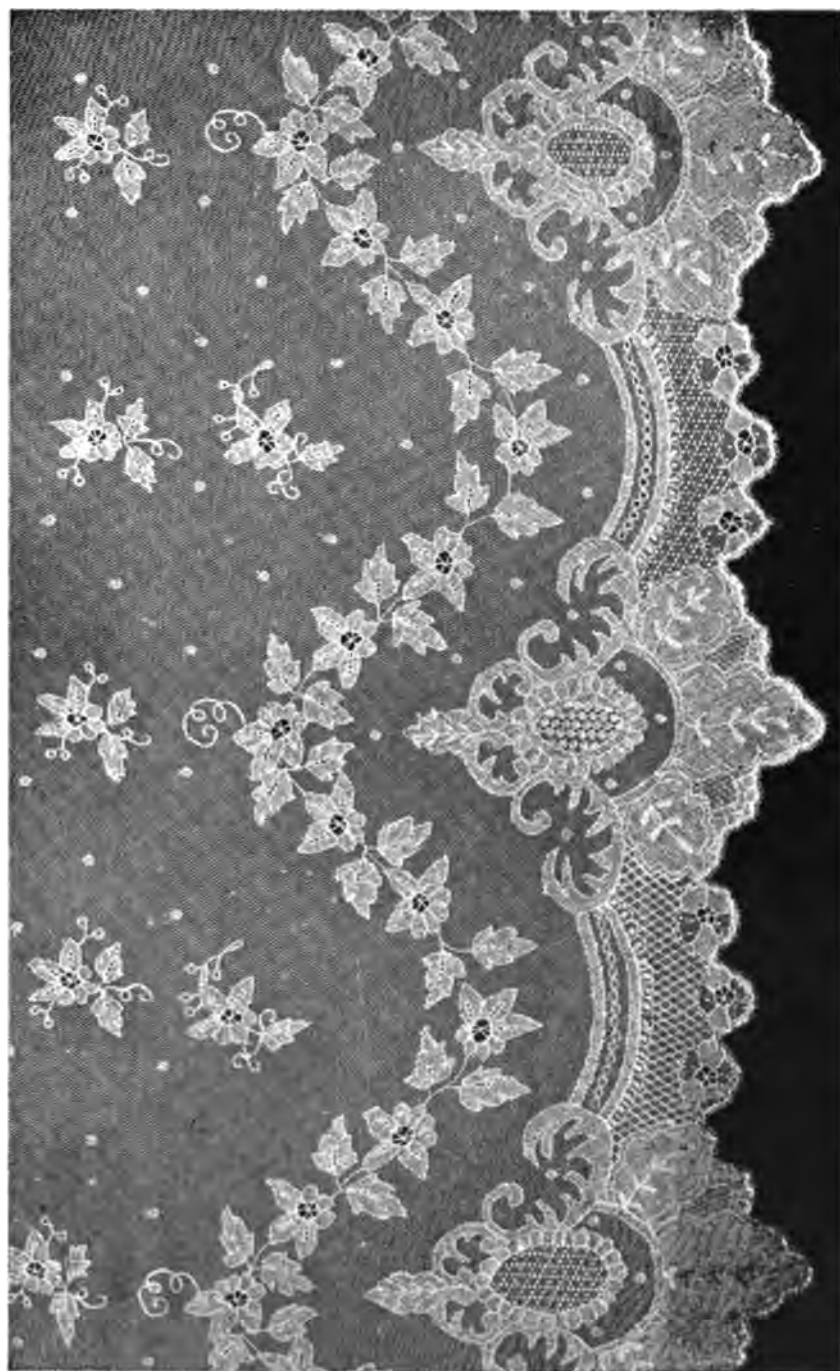


Fig. 14.--Modern Limerick Run Lace.

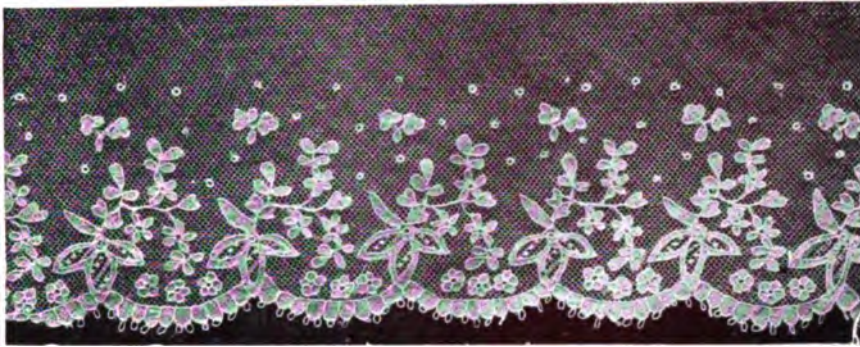


Fig. 15.—Old Appliquè, Carrickmacross.



Fig. 18.—Sketch of Fan Design.
By Miss Alice Jacob.

Fig. 10 represents a flounce of needle-point lace from Kenmare. The design is very elaborate and rich in details. A ribbon flows in a scroll-like manner along the lower portion of the flounce in part forming the edge; and at the top we have a narrower ribbon which, in places, appears to loop over the engrelure; small garlands and bouquets of flowers are attached to this ribbon.

The conventional ornament which separates the fine hexagonal meshed ground from the tied or barred portion is carefully drawn and well arranged; it contrasts successfully with the sprays and flowers which are tossed about in lines of playful growth. The workmanship is excellent.

Raised needle-point, better known as Inisbmacsaint lace, is made at Miss Maclean's Class, Benmore, Enniskillen. It is also made at Miss Keane's Class, at Cappoquin, county Waterford, and at New Ross Carmelite Convent, at Youghal, and at Kenmare.

Pillow lace is made at the Convent of Mercy, Birr, and was made until lately at Miss Elwood's Class, Cong, county Mayo, and to a small extent at Golden Bridge Convent.

Fig. 11 is a specimen of a pillow lace trimming made at Birr. I do not think it fairly illustrates the excellent work done at that lace centre. The design is not quite satisfactory. The forms seem to be rather large for the depth of the border. There is not sufficient evidence of construction in the pattern; it should always be remembered that one great advantage which hand-made has over machine-made lace is, that the repeat need not be short, as it must of necessity be in the latter. In this border the repeat is much too short, and so the lace becomes monotonous. The ties are not well arranged, and the forms are not remarkable for beauty of drawing.

Limerick lace, which is an embroidery or net, is of two varieties, "run" and "tambour." It is made at Mrs. Vere

Limerick Lace. O'Brien's Class, and elsewhere in Limerick.

This lace is also made at the Dominican Convent, Cabra, at Kinsale, and at Golden Bridge Convent. To Mrs. Vere O'Brien the Limerick lace workers owe a great deal. Were it not for her sustained efforts to benefit the workers during some years past, the industry in that locality would have fallen into a state of complete decay.

Mrs. Vere O'Brien was one of the first to perceive the value of change of pattern, and the Cork School of Art was indebted to her for many encouraging orders for designs.

Fig. 12 is an example of old Limerick tambour lace. The pattern consists of a rather violently twisted spray, and an edge of detached blossoms which follow one another in a monotonous fashion. The design is not unsuitable to Limerick tambour work, and no doubt was highly prized before the days of machine-made lace. One cannot but feel, however, that there is not sufficient variety; any such which may exist is gained by the alternation of a tall and short spray of the same description of foliage. The remarks which I have before made on the variety which may be gained in hand-made as opposed to machine-made work are, I think, equally well exemplified in this illustration.

Fig. 13—Modern Limerick tambour lace. This pattern is well suited to this description of lace. The trailing arrangement of the sprays, tied in places with bows of ribbon, and the strings of pearls combine to impart grace and lightness to the design. Large forms cannot, as a rule,

be well rendered in this lace, and small forms, in order to be effective, require to be separated from one another.

Fig. 14 is an example of modern Limerick run lace. The design is based upon the idea which one so often sees in Brussels laces, and which has perhaps become a little tiresome from its too frequent repetition; that is, a separate conventional border in which fillings are introduced, surmounted by sprays or garlands of leaves and flowers. I think a certain stiffness of treatment exists where the curves above the three flowers in the border are attached to the curves of the conventional ornament. In Limerick run-work, there is always a squareness of form which should be taken into account in designing for it; and forms which depend for effect upon the beauty of their curves are likely to suffer in their translation into run lace. The garlands of leaves and flowers are well arranged, and work satisfactorily.

Carrickmacross lace is made at the Bath and Shirley school, Carrickmacross, at Crossmaglen, and the surrounding districts. It is of two kinds, "appliqué" and "guipure."

Carrickmacross Lace. It is not a true lace, as the work, which in needle-point would be called the "tight-work," and which is made with the needle, consists, in Carrickmacross lace, of cambric. The ground, also, where it is "appliqué" is a net ground. Very pleasing effects, however, are obtained by the use of needle point fillings, brides, or ties, &c. Combinations of guipure and appliqué varieties have been tried with considerable success.

Fig. 15 is an example of old Carrickmacross appliqué on net. The first thing that strikes one is the shortness of the repeat, which is, as I before told you, a characteristic of machine-made lace, and results in monotony. The edge is simple, made up of a series of small petals, placed side by side. Observe the absence of construction in the pattern, which consists of one large three-lobed leaf, joined to a spray containing leaves of a quite different character. There are also three detached flowers which apparently have nothing to do with the spray nor with one another. The practice of cutting away the centre of the leaf and inserting a filling was very much in vogue with the Carrickmacross lace-makers in former days. I think it was most objectionable; no doubt it arose from a desire to give relief to the leaf by making a cut showing the place of the midrib; this was quite permissible, but workers who knew nothing about the midrib of the leaf, its position or shape, cut away the surface of the leaf until a mere fringe of cambric was left, and the leaves presented the appearance of having been eaten away in the centres.

A considerable improvement has, however, taken place, as will be seen by reference to fig. 16, two lappet ends of modern appliqué. The design and workmanship of these are admirable; you can notice the graceful climbing arrangement of the ornament constructed for a surface which is to hang vertically. The midrib of the leaf is better expressed than in the preceding example, less of the surface has been cut away. The design is based upon the arrangement which is seen in many of the old lappets of the eighteenth century. Richness is obtained by using the fillings in panels formed by the ornament, and monotony is prevented by the alternation of the fillings. Observe the good drawing of the flowers and leaves, and the well rendered curves of the stems. This is particularly noticeable in the right-hand lappet, at the bottom of which a well drawn spray reflects great credit upon both designer and worker.



Fig. 16.—Modern Applique, Carrickmacross.



Fig. 17.—Modern Carrickmacross Gulpure.



Fig. 17a.—Modern Carrickmacross Gulpure.

Fig. 17 represents a portion of a border of modern Carrickmacross guipure. In this lace, portions of the cambric and net are completely cut away, and bars or ties are inserted. The design consists of a combination of conventional with floral forms: the edge is formed by an arrangement of flowers placed side by side so as to form a sort of festoon. There is a certain quaintness about the treatment of the pansies which is not displeasing. Perhaps the only objectionable portion of the arrangement is the manner in which the stem starts from the second flower at the left-hand side. (fig. 17a). The difficulty of concealing the starting point of stems is one that has constantly to be dealt with in designing. In this case I cannot but think that it would have been better to have frankly accepted the starting-point; a small space might have intervened not only without detriment to the design, but with a positive advantage to the construction and flow of the curve.

Fig 18.—Perhaps it may interest you to see the preparation of a design. Here is a photograph taken from the first rough sketch of the design for fig. 19. After the shape of the fan has been laid down, the leading lines of the pattern are sketched in with charcoal; these are observable on the right side of the figure. As soon as the leading lines are arranged, the designer sketches in with charcoal the masses and chief features in the design. Then, with a brush and some sepia, the design is advanced a step further, as shown at the left-hand side of the illustration, all the forms in which have been drawn at once by means of the brush. Lastly, an accurate outline is made from this sketch, and forms the working drawing which is handed to the worker.

Fig. 19 is a photograph from the finished fan. It is a combination of appliqué and guipure, and has worked out most successfully. The design, which is very good, was made by Miss Jacob of the Metropolitan School of Art.

Greek lace (so called) is made at Miss Keane's Class, Mrs. Montgomery Stewart's Class, Strabane, and at Killarney Presentation Convent. It resembles the earlier forms of lace and is a true needle-point. It is often used for insertions, and sometimes for trimmings.

Cut linen work is made at the Convent of Mercy, Kinsale.

Crochet lace has, for many years, been an important cottage industry.

Some years ago the demand for this lace in the South of Ireland was very great, and several people made large

Crochet Lace. fortunes by dealing in it. I have been assured by a traveller for one of the large houses in

Cork that, at the flourishing period of the trade, he could have sold ten thousand pounds' worth of crochet in one day if he had had the material with him. The result of this demand was that the crochet-workers became mere producing machines. No attention whatever was paid to pattern, and, after a few years, people refused to buy such a carelessly made fabric. Crochet lace is always received with favour in Paris, where it is known as "Point d'Irlande." I have been told by M. Lefebvre that Irish crochet has a peculiarly distinctive character, which it is impossible to imitate on the Continent; and that if the lace became really fashionable, and proper attention was paid to the effects which might be produced in it by careful supervision, it was still possible to make it one of the leading and most attractive of laces.

It is interesting to endeavour to trace the origin of the peculiar forms which may be seen in the antimacassars of bygone days. The original patterns were derived from specimens of Venetian rose-point, but they have become so degraded as to be with difficulty recognizable. Until lately, one of the great obstacles to the improvement of the crochet industry has been to find workers capable of translating crochet pattern into work. Give a worker a piece of made crochet, and she will have no difficulty in copying it, while she will probably find it impossible to work from a drawing. When I visited Clones a few years ago, I could only hear of one worker who could make crochet from a paper pattern. I am happy to say that some improvement has taken place in this respect. The work produced in different districts varies in character. That made in the South of Ireland is more open, and contains larger forms than the northern crochet. The Clones crochet is very beautiful, has a distinctive character, and is in my judgment capable of great development. The chief centres for crochet making are Cork, Youghal, Kinsale, Crosshaven, Clones, Ardara, and several other places, where it is made in small quantities.

Fig. 20 is a border of old crochet. This example does not exhibit the degradation of form, of which I have just spoken, to the same extent as one may see it exhibited in the large antimacassars or pieces of ecclesiastical crochet of former days. Many of the old crochet forms were evidently derived from Venetian or Spanish rose-point; and owing to the facts that the designer could not draw, nor the worker render them properly, they gradually, but surely, deteriorated into the unmeaning shapes observable in crochet. In this lace, the forms are made separately by the worker, and the practice has been, as I have myself witnessed, for the worker to take a large sheet of brown paper cut to the size of the flounce or trimming, and on this to scatter crochet forms, keeping them pretty evenly distributed: they were then secured to the paper, and joined by a ground made in imitation of the ties or bars seen in the rose-point lace. There was no serious attempt at arrangement, and such principles of ornament as repetition, alternation, &c., were not considered.

The piece illustrated is a border made up of a curious trefoil-shape suspended from a horizontal bar, having a pattern at one end. This is apparently meant for a stalk carrying a leaf and a flower; then there are three shapes, which I think are intended for flower forms, on the ends of stems which project with great energy from a common centre. The only attempt at arrangement appears to be that of alternation, when the trefoil is below, the three-armed form is above, and *vice versa*. I am sure you will recognize this style of crochet pattern as one that was in vogue for many years. Now turn from it to fig. 21, which also exhibits a border, made at Ardara from an improved design. There is no difference in the method of working; the forms are made separately as in the former instance, secured in their places on the pattern, and the ground worked between them. The edge of the border is carefully considered; the small scalloped forms are well rendered. We have the principles of alternation and radiation exhibited in this pattern. Observe the six little trefoils, they are well made and arranged. One feels instinctively, on looking at this pattern, that thought, order, method have all been at work in the preparation of the design. The ground is more carefully rendered than in the preceding example; the weight of the pattern is at the edge of the border; and from the fact that the ties are lighter, cloudi-

ness of effect in the ground is prevented, and greater contrast between the ground and pattern is secured.

Fig. 22 is an example of New Ross crochet, which is made up of simple forms, and yet exhibits the richness to be secured when these forms are well arranged with due regard to contrast. The edge is made up of small trefoils similar to those used in fig. 21. The heart-shaped forms contain ornaments which alternate, thus preventing monotony; and above these, six-leaved flowers or *parterres* alternate with floral forms arranged on the diagonals of a square. These heart-shaped forms are difficult to render properly in crochet. Forms which depend upon beauty of curve alone, such as scrolls, &c., cannot be well rendered in crochet, and should be avoided, or only introduced when excellently made; even then, the bars or ties frequently pull them out of shape when the piece of work is released from the pattern. In this specimen the ground is prettily enriched by the use of little star-like forms which occur at the junction of the bars, a device which may be seen in some of the Venetian laces of the seventeenth century.

Fig. 23.—This collar of Cork crochet affords another example of the effect which may be secured by good arrangement. There is evenness of distribution, the forms are well shaped, and have evidently been carefully made from good drawings. Observe the pretty effect gained by the introduction of the seven star-shaped forms which occur on each side of the conventional ornament in the narrowest part of the collar, also the well arranged sprays which compose so well into the angles at top and bottom of the illustration. The edging also is worthy of notice; the small five-leaved stars suspended, as it were, by chains from the edge have a rich effect. The barring is well arranged, and the forms have been put together with great care, testimony to which is borne by the photograph, inasmuch as it has been taken directly from the lace.

It would be very remiss of me not to mention the efforts which have been made for the development of the lace industry by Mr. Alan S. Cole. He has given considerable time and attention to this question. To him was due the formation of a Committee in London, in 1885, the raising of subscriptions for the purpose of offering prizes for good designs, and the giving of orders to the lace centres for pieces to be made from these patterns. In this way the sum of £500 was expended. From 1884, Mr. Cole paid visits once or twice a year to the most important centres, in order to report on their progress, and spur them on to fresh exertions. I rejoice to say that these visits, after having been discontinued for the past three or four years, have now been resumed, for I well know what a stimulating effect they had upon both workers and designers.

To the Countess of Aberdeen great credit is due for her practical efforts to help this along with other industries. After Mr. Ben Lindsey's death, she purchased 76, Grafton-street, for the purpose of enabling the lace centres to have an opportunity of disposing of their work; and those who know of its working can testify to the fact that, if the shop had closed, serious injury to the lace trade would have resulted.

There is ample reward for willing workers. The Royal Dublin Society, by its annual exhibition of Art Industries at Ball's-bridge (in which lace takes such a prominent part), and the liberal prizes it

offers, is doing its utmost to stimulate efforts and draw public attention to good work. It is spending over £200 per annum for this purpose.

The Committee of the Branchardière Fund devotes the whole of the income arising from the interest of that fund to the following purposes :—It gives aid towards the cost of trial pieces of lace made from new patterns ; it gives rewards to the workers of those pieces of lace and crochet which obtained prizes at the Royal Dublin Society's exhibition ; it gives grants to enable lace mistresses and workers to obtain technical knowledge in lace-making, drawing, and design ; and it makes purchases from the designs exhibited at Ball's-bridge, for the purpose of giving those designs to the lace makers. Thanks to this fund, there is thus a regular system established by which it seems to me that lace centres have facilities for improvement which they never before possessed. Any lace centre may write to the Secretary of the Branchardière Fund (Irish Industries Association, Dublin), for a design for some particular lace. Aid will be given towards the expense of making a trial piece from that design. The Royal Dublin Society affords the means of placing that lace before the public, and gives a reward to the lace centre if the lace should prove its superiority. And, lastly, the workers who make the piece of lace receive rewards. There is thus a continuity of action, which, if properly availed of, must, I think, contribute largely to success.

Having said so much, there are, it seems to me, two questions which we may fairly ask : firstly, is the revival of Irish lace-making of such a nature as to lead to permanent results ? secondly, is it worth while endeavouring to compete with machine-made lace ? In answer to the first, I am of opinion that much good has resulted from the revival ; the character of the lace has been distinctly and admittedly improved. One need only look carefully at the hand-made lace exposed in the shop windows and at the Horse Show at Ball's-bridge in August of each year in order to see this, but, as to the permanency of the movement, I confess to some apprehension. Owing to the peculiar circumstances of the Convent classes in which lace is chiefly made, and their isolation from the centres of industry, there is always a danger of their falling behind in the struggle for perfection. I do not think their efforts, of late, have been marked by the same persistency as in former years. They are easily discouraged, and require constant incitement to fresh enterprise. The supervision of the needle-working in the Convent classes is no doubt carried out by the nuns who have charge of the workrooms, and, to a certain extent, by the lace mistresses in the districts where laces are made in the workers' homes ; but I am not referring to this, which is the purely technical part of lace making. I refer rather to the supervision which makes itself acquainted with the demands of the market, which takes care that none but the best patterns shall be used, and that these shall be constantly changed, that the lace made shall be even in quality, and of the best materials, that all bad work shall be rejected, and that the requirements of fashion shall be attended to. This is the kind of intelligent supervision to which I refer ; and one which, if it succeeded in gaining the confidence of the various lace centres throughout Ireland, would, I believe, be productive of great results.

In answer to the second question, I am of opinion that machine-made lace will satisfy the wants of the many ; but there will always be a certain number of people who will appreciate and demand the hand-made article. I think that the existing lace centres are quite adequate



Fig. 19.—Carrickmacross Fan. Combined Applique and Guipure.
Worked for the Irish Lace Depot, Dublin.



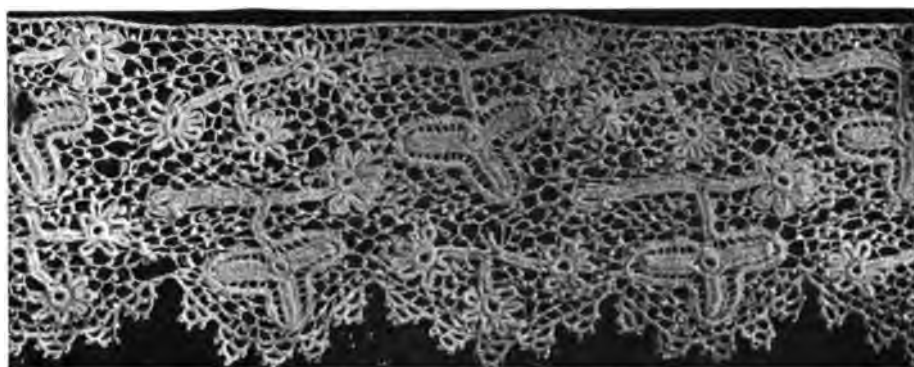


Fig. 20.—Old Crochet Lace.



Fig 21.—Modern Crochet Lace.
Ardara, Co. Donegal.



Fig. 22. -Modern Crochet Lace, New Ross.

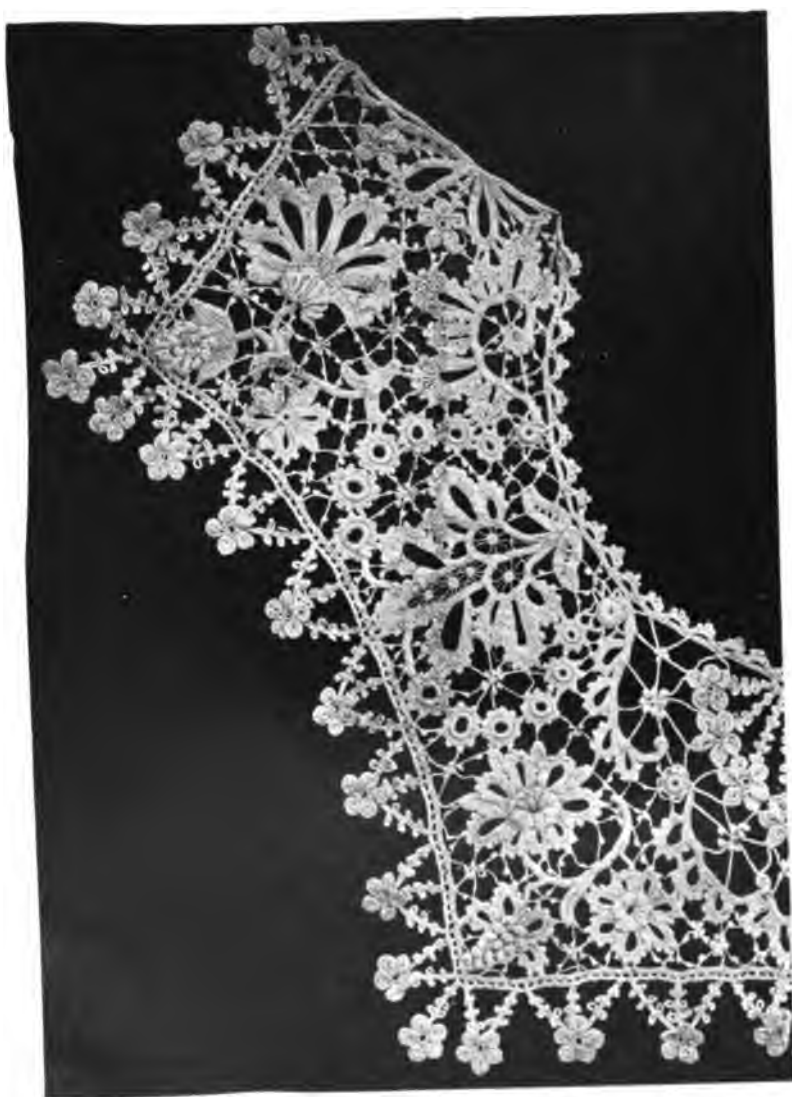


Fig. 23.—Cork Crochet.

to supply the present demand for hand-made lace. Of course no one can say what the dictates of fashion may require in the future. But the hand-made article may never expect to keep its place in the market, unless it can prove its superiority to the machine-made work. The machine has no soul; here is where the advantage of the worker comes in; the worker can put thought and intelligence into every form if she feels a perfect interest in what she is doing. If she is merely a lace-producing machine, with no desire to express beauty of form in the material, then the machine is bound to conquer, for it will certainly out-rival her in accuracy and neatness. There is at the moment a revival in the demand for hand-made work in many industries, and all hand-workers, no matter in what material, must remember that thought and feeling can be expressed as well by the stiff, unyielding metal, as by the pliant and supple thread when they pass under the worker's hand; and that without this thought and feeling their work is a dead thing, and it were better that it had never been attempted.



Irish Spinning Wheel.

MARKETING OF IRISH LACE.

The workers in Irish lace have had till recently many difficulties in reaching a market worthy of their work. Some of the finest fabrics are produced by country girls, who ply their needle in very modest cottage homes, and who often give to lace-making only the hours which they can spare from their labour on their father's farm. The guipure and appliqué of Louth and Monaghan, the beautiful crotchet of Monaghan, Armagh, and Fermanagh, are, in large part, manufactured under these conditions. And many of the workers who have been introduced to the industry under the especially able guidance of Mr. Walker, of the Congested Districts Board, are obliged to submit to the same difficulties. It is often a matter of wonder to those who have looked into the conditions of the industry, to find spotless pieces of exquisite work delivered from homes which seem oddly out of keeping with these dainty products. The point lace of Youghal, Kinsale, and other centres is produced in much more favourable circumstances. The industry is here promoted by communities of nuns, and the workers have the advantage of a clean, well-lighted workroom; though in these centres, also, much of the work is done in the homes of the workers.

Where the officers of the Congested Districts Board are the guides of the workers, the marketing of the lace is duly provided for. The workers are not only instructed in the methods of industry and supplied with suitable designs, their work is also sent to the best markets, and they receive the full market value of their products. The same may be said of the work done in the larger convents which have established the industry on a successful basis. But in remote country districts the supply of designs was, till recently, both antiquated and inadequate, and the lace was sold to some shopkeeper in the nearest country town who had trade connections with the shops or wholesale dealers of Dublin, Belfast, or London. The remuneration of the workers was not determined by the competition of a wide market, and they suffered accordingly. There were other disadvantages incidental to dealing with a shopkeeper who was first a trader in grocer's or other wares, disadvantages which may be hinted at, but need not be further explained.

The Irish Lace Depôt, established in Dublin by the late Mr. Ben Lindsey, did much for the marketing of Irish lace, and helped largely to the improvement and development of the industry. In Mr. Lindsey's time, the institutions and the individual workers connected with him had a ready and remunerative market for their work. I am acquainted with one institution which sent all its supplies of point lace to his Depôt, and which was able to pay £1,500 a year in wages to its workers. But after Mr. Lindsey's death this outlet for Irish lace became sadly ineffective. A few years after his death, the institution to which I have referred had much difficulty in paying £600 or £700 a year to the same body of lace-makers.

Lady Aberdeen, in her efforts to revive the decaying industries of Ireland, had opportunity of discovering what the gradual decline of the Lace Depôt meant for the lace industry. She was about to leave Ireland for Canada, but before leaving she took a step which has had a remarkable influence on the fortunes of the Irish lace industry. She purchased the Lace Depôt and its remaining stock, and entrusted the

business which it carried on to a few gentlemen who were associated with her in her philanthropic undertakings. From her home in Ottawa she kept up communication with her representatives in Ireland, and by her advice and co-operation largely helped to the success which they achieved.

After a few years Lady Aberdeen and her helpers formed themselves into a limited liability company, in order to put their lace trade on a strictly business footing. The company was somewhat peculiar in its constitution and methods. All the shareholders, seven in number, were directors. Each of them held a single £1 share; and the articles of association provided that no dividend should be paid on the shares, and that all profits should be employed by the directors to develop the lace industry in Ireland and improve the condition of the workers.

At the same time that Lady Aberdeen was carrying out this scheme, Mr. Horace Plunkett and his associates were spreading the knowledge of co-operative methods and organising co-operative societies in the rural districts of Ireland. Co-operative associations of lace-workers were formed early in the movement, and these increased in number and efficiency as the movement spread and took firmer and firmer hold of the country. In these co-operative societies the directors of the Lace Depôt found steady sources of supply. Instruction could be readily given to bodies thus organised, the execution of large orders could be counted on, and the development of a trade constantly increasing in volume and value become possible. The organisation introduced by the Congested Districts Board coincided with the growth of co-operation, and helped to the same end.

To co-operative societies of lace-workers and to other organisations of lace-workers, the Depôt supplied designs. From these and from the schools of the Congested Districts it took the lace, when manufactured, at market prices, sold it in the best markets accessible, and after defraying expenses and providing for the interest on borrowed capital, gave the societies of workers a bonus proportionate to the value of the lace they had supplied. It furthermore paid the salary of a teacher for those organisations which were unable, without this assistance, to procure competent instruction in lace-making. How its operations under these several heads have grown since the date of its establishment in 1893-4 is shown by the following figures:—

	Sales.	Grants to Workers.
1895,	£4,230	—
1896,	£5,227	—
1897,	£6,904	£50
1898,	£7,937	£85
1899,	£11,130	£250
1900,	£23,149	£400

The development of the Irish lace industry which the operations of the Lace Depôt have effected have called into existence other agencies of distribution, which, by enlarging the market have rendered competition more active. The sales carried out in London by the Irish Industries Association, of which Lady Cadogan is now President, have largely contributed to introduce Irish lace to favourable markets. With twenty-three co-operative societies of lace-workers, sixteen successful schools under the Congested Districts Board, and large numbers of unorganised workers furnishing an abundant supply, and the Lace Depôt and other agencies opening the way to the market, the prospects of the lace industry in Ireland are distinctly hopeful.

ART AND COTTAGE INDUSTRIES OF IRELAND.

The principal cottage industries of Ireland are HAND-WEAVING and SPINNING, LACE-MAKING, HAND-KNITTING, and EMBROIDERY. Of the extent to which these are practised no accurate statistics are available. In many cases they are carried on in spare hours as subsidiary occupations to farming and household work. There can be no doubt, however, that they are widely diffused over the country, and add largely to the comfort of many hundreds of families—especially in the poorer districts of the West of Ireland. They are nowhere so much practised, or in so much variety, as in the county Donegal; which offers a kind of microcosm of the cottage industries of Ireland. Weaving and spinning, drawn-work, white embroidery of every description, and knitting, have been for generations practised in the cottage-homes of Donegal, and have so trained the hand and eye that lace and crochet making—an industry of more recent introduction, and one very difficult to plant in a new locality—became almost immediately a success in Ardara, Glencolumkille, and other centres of that county; where, as shown by the exhibitions of the Royal Dublin Society, the Irish Arts and Crafts Society and the Irish Industries Association, work of the highest artistic merit is now being produced. The excellent quality of the manual labour to be found in Donegal has also, no doubt, conduced to the success of the hand-tufted carpet industry lately established by Messrs. Morton at Killybegs, the beautiful work of which formed a very striking feature in the Arts and Crafts Exhibition held in Dublin in the winter of 1899.

In discussing in greater detail some of the more interesting features of the above-named industries, we may begin by a brief account of the manufacture of home-spun cloth in Ireland. It may surprise many to learn that the hand-loom and the spinning-wheel are still capable of holding their own against steam machinery in any quarter of the United Kingdom, but such is the case in some districts. Hand-spun and hand-woven cloth, dyed with the lichens and plants which the Irish peasant has understood how to use from time immemorial, is not only a peculiarly comfortable material to wear, but has a certain artistic character of its own, possessing a distinct market value—which is so well recognised in the trade, that attempts, more or less unsuccessful, are constantly being made to imitate by machinery the effects of genuine home-spun, and power-loom cloths are sometimes even fumigated by peat smoke in order to further the illusion that they have been produced in a peasant's cottage. We speak here of woollens chiefly, for in linens the power-loom has practically supplanted the hand-loom save as regards the very finest cambrics, while the linen spinning-wheel has entirely disappeared from Ireland, though in France it is still in use for the production of yarns whose delicacy no existing agency of a purely mechanical kind can approach. But hand-weaving and spinning in wool still

hold their ground in Donegal, Connemara, Kerry, and a few other districts—such as Castlebar, county Mayo—where there is mountain grazing for a hardy breed of sheep, and where there is much superfluous labour during the winter months as well as an hereditary aptitude for dealing with wool. It is principally in county Donegal that we find home-spun cloth produced not merely for local use, but for sale outside the district—the local dealers having agents in the principal cities of Great Britain and Ireland. The Irish Industries Association, which buys at the monthly fairs at Ardara and Carrick, has ascertained that in the southern promontory of county Donegal—a very barren and desolate region lying west of a line drawn from Ardara to Killybegs, and measuring some fifteen by twelve miles—a sum of about £7,000 is annually paid for home-spun cloth, of which the Association accounts for about one-seventh. The cloth is sold at the monthly fairs, to which it is brought in large rolls or webs, measuring generally from 25 to 50 yards in length, and about 28 inches in width. Double-width cloth is practically never made on hand-loom in Ireland, as a loom of the requisite size could rarely be accommodated in a peasant's cottage or weaving-shed. It may, therefore, be safely concluded that the term "home-spun" is a misnomer if applied to any Irish cloth of 56 inches wide or thereabouts.

The technical details of the industry, which may be seen practically illustrated in the Irish Pavilion at the Glasgow International Exhibition, as well as in numberless cottage-homes in the West of Ireland, are not only interesting in themselves but are worthy of observation as exhibiting the germs of the whole textile industry which, under the influence of steam power and the Jacquard loom has attained such mighty proportions.

It is generally believed that the textile art had its origin in plaiting, and the implements used for weaving among

Origin of the Textile Art.

savage races would seem to confirm this belief. The way to manufacture some kind of cordage out of rushes or grass must have been very early discovered, and it must have been soon found out that cordage could be turned, by plaiting, into a thin, flexible sheet of material capable of being used for a great number of purposes and of being richly ornamented. Weaving, in the proper sense, occurs when there is a fixed warp held in a state of tension while a weft consisting of a continuous thread is carried backwards and forwards across and among the strands of the warp, forming a selvage at the side of the web. It may also, perhaps, be considered as essential to the true conception of weaving (as distinguished from "darning") that there should be the device known as the "heddle-leaves," for separating the strands of the warp so as to permit the thread of the weft to pass among them, and then re-crossing them so as to grasp that thread and form an opening or, as it is technically called, a "shed" for the next one.

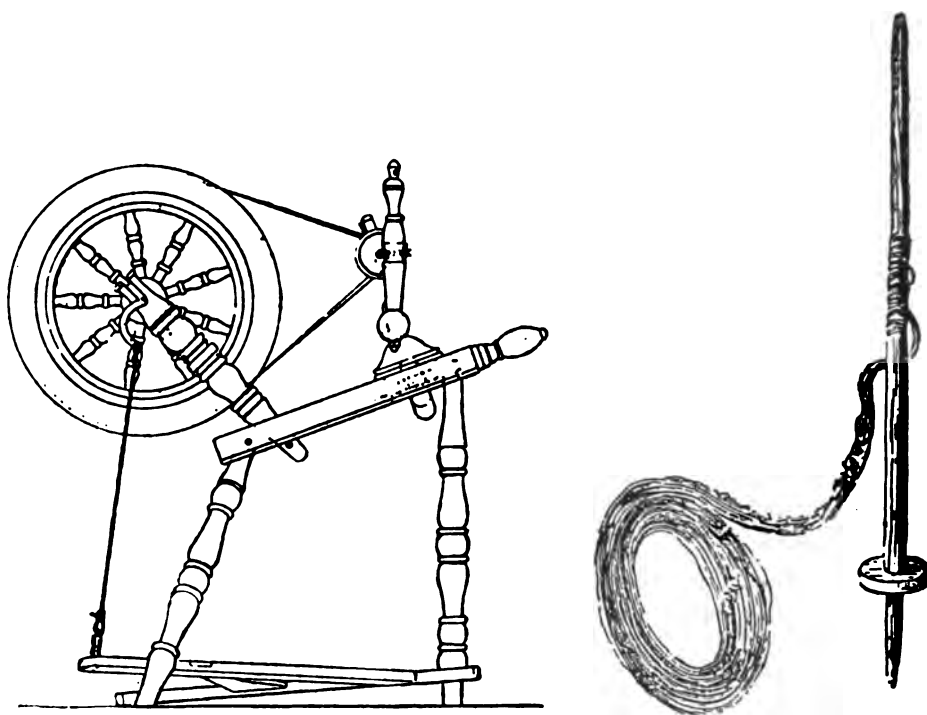
But before we deal with weaving we have to consider how the thread intended to be woven is produced, or, in other

Spinning.

words, the art of spinning. To obtain the fibre and to bring it into a proper state for spinning, it is necessary, in the case of vegetable materials, such as flax or cotton, that some process of maceration should be gone through, while wool has to be cleansed and separated from dirt; and, whatever the material be, it has to be "carded" in order to reduce it to a soft, fluffy state, without lumps or knots, so that it can be readily spun into an even thread.

The cards consist of two implements, something like wire hairbrushes, between which the wool is combed out and then by a dexterous movement turned off in the form of a little fluffy roll, which, under the manipulation of the spinner, resolves itself into an even thread. In machine-carding, rollers set with steel bristles take the place of cards, but the principle is quite the same.

Spinning can be done by the hands alone by merely taking up some of the fibres of the material and twisting them. But at some period, far earlier than any record can help us to fix, two devices were introduced to meet the two grand requirements of the spinner—a means of making



Treadle Wheel, and Spindle with Whorl.

the rotary or twisting action more or less *continuous*, and a means of readily *winding* up the spun yarn. These were provided by means of the combined spindle and whorl, of which an illustration is here given. The spindle is simply a piece of wood about a foot long, and the whorl a circular disc of stone, clay, or metal with a hole in the centre into which the spindle is firmly inserted. A piece of yarn twisted with the fingers is first attached to the spindle, a twirl is then given to the apparatus which hangs suspended by the thread which it spins, and when twist enough has been given, the thread is held at right angles to the spindle, the motion of the latter is reversed, and the thread is wound up. This method of spinning is still in vogue in parts of Brittany, Italy, &c.

The next step in advance was to separate the whorl from the spindle and to fix the latter horizontally in certain bearings so that it should not have to be supported by its own thread. The spinner was then not so much at a loss if the thread broke, and she could regulate its tension as she pleased. We now find the whorl transformed to a large fly wheel connected with the spindle by means of a continuous band or cord, and set in motion by the hand. The whole arrangement is set up on a sort of wooden bench. Examples of this "large" spinning wheel, which is the next step in evolution to the spindle and whorl, may frequently be seen in cottages on the west coast of Ireland.

The improved or "small" spinning wheel, which can likewise be seen in operation in Ireland, especially in county Donegal, represents the final step in the perfecting of spinning appliances until the introduction of steam machinery, and is a far more ingenious and complex piece of mechanism than anyone would suppose who had not studied its various parts, here illustrated in diagram. The most obvious advance on the hand-wheel is the fact that the rotary motion is given by the foot, by means of a treadle connected with the axle by a crank. This makes the motion continuous and even, and allows the spinner to apply both her hands to the manipulation of the wool. Furthermore, the feed of the fresh material to the twisting thread is now more regular, because the change of position, to turn the twisting motion into a winding one, is now no longer necessary. This improvement is attained by separating the implement which twists from that which winds. Both whirl on the same axis, one, the twister, or spindle, passing through the winder, or bobbin, which revolves loosely on it. But the bobbin and the spindle are connected by separate cords with the flywheel, and the grooved wheel, or pulley round which the cord passes is in each case of a different diameter. The diameter of the pulley wheel of the bobbin is smaller than that of the pulley wheel of the spindle. It, therefore, revolves more quickly than the latter, and carries the thread round it by means of a "fly" set with a number of little hooks, along which the thread is shifted according as it gets sufficiently wound up on one spot on the bobbin.

Nothing more ingenious and complete could well be devised than the arrangements of the "small" spinning wheel, which is now in general use in the Donegal hand-weaving industry, though it has not as yet ousted the large wheel in the other districts of Western Ireland. In these devices the germ of all later improvements, whatever the motive power may be, is fully contained.

The development of the art of weaving was affected in recent times by one striking and epoch-making invention—

Weaving.

that of the Jacquard appliance for pattern weaving—but apart from this, the methods in use at the earliest times, and among savage races at present, show, in principle, but little difference from the perfected looms of the present day. There is a Greek vase painting of about the year 400 B.C., showing the famous loom of Penelope, on which she wove day by day, and picked out night by night, that web of rich and fair design at the completion of which she had promised to make her choice among the suitors who besieged her during her husband's long wanderings after the fall of Troy. The loom there depicted is very similar to the Gobelins tapestry looms used at the present day. In this form of loom, and in early looms generally, the warp is usually set vertically to the ground, not horizon-

tally as is usual at present in all except tapestry looms. Disregarding the latter, which relate to a very special and peculiar branch of the industry, we may say that the modern hand-loom has to provide for three distinct actions in order to produce a woven fabric. There has to be, in the first place, a method of separating and recrossing the threads of the warp, without which the shuttle bearing the thread of the weft would have to be laboriously *darned* in and out among them. This is done by means of the "heddle leaves" already mentioned, which are practically sets of strings, arranged on a wooden frame, with eyelet holes in the middle of each through which the threads of the warp are passed. Each set or "leaf" of the heddles is under control of a lever actuated by a treadle below the weaver's foot, by means of which he can raise or depress all those threads of the warp which pass through the eyelet holes in that particular leaf. If two leaves only are used, half the threads of the warp going through each leaf, the only cloth that can be woven is plain flannel, without pattern of any kind. But if the number of leaves is multiplied it is evident that by throwing up now some, now other threads of the warp, and doing this in a certain order of succession, patterns of much variety can be produced. When warp and weft are of different colours, these patterns of course are much accentuated. It is in this way that twills, herring-bones, hopsacks, and other varieties of textile patterns, including the elaborate designs of damask weaving, are produced.

Secondly, there has to be some convenient means of conveying the thread of the weft from side to side of the warp. This is done by means of a shuttle. A shuttle is really a huge needle, hollow in the centre, and having in that hollow a bobbin or "pirn" on which the thread of the weft is wound, unwinding as the shuttle goes on its journey. The old way of passing the shuttle from side to side of the warp was simply by throwing it from hand to hand, and this method can be seen in the old-type hand-loom in the west of Ireland. The new and much superior and quicker method of jerking it across by means of a cord, attached to pieces of wood or horn that strike the shuttle from side to side, has now been introduced there.

Finally, we come to the sley, which is simply a sort of swinging frame in which a comb is set. The threads of the warp pass through the teeth of this comb or "reed," and when each thread of the weft has passed across the warp the reed is swung up against it so as to press it firmly home and make the texture sufficiently close. When a few inches of cloth have been thus woven they are rolled up on the "cloth-beam" which is placed under the web close to the weaver's knees, and a corresponding amount of yarn is unrolled from the "yarn-beam" at the other end of the loom. In the new type of hand-loom introduced into Donegal by the Irish Industries Association, with the aid of the Congested Districts Board, this combined rolling and unrolling action is performed by means of an attachment which enables it to be done automatically by the mere motion of the sley without stopping the loom.

The explanation already given of the way in which patterns are produced by working a number of heddle-leaves will

The Jacquard Loom. enable the reader to understand the principle of the great invention of the Jacquard loom—the greatest stride in advance that weaving has taken since the very origin of the art. It dates only from the beginning of the present cen-

tury, and the discovery must be largely credited to the French Government, which commissioned M. Jacquard, a well-known inventor in the textile industry, to produce an appliance which would enable patterns of any degree of complexity to be produced by one single unvarying action on the weaver's part, just as a tune is ground out by turning the handle of a barrel-organ—the old method of weaving pattern designs being comparable to the way in which a tune is played on the piano, only with the drawback that a single wrong note, that is to say, a single thread going where it ought not, meant the irretrievable defacement of the pattern. The Jacquard invention consists simply of a number of perforated cards which are pressed in succession, by the action of throwing the shuttle, against a number of points of wires controlling the raising or depressing of the threads of the warp. The perforations are different in each card, and in these perforations, and the proper succession of them, the pattern is contained, as a tune is contained in the arrangement of spikes on the cylinder of a musical box. Wherever a wire comes opposite one of these perforations it passes through it—where it finds no perforation it is forced back—and the result is respectively an engagement or disengagement with certain levers which control certain threads of the warp. The weaver, therefore, has no more to do with making the pattern than the organ-grinder has with the tune he grinds out. The tune or pattern in each case has been thought out beforehand and placed upon the mechanical appliance furnished complete to the executant. It may be added that this invention has never found its way into the cottage weaving industry of the west of Ireland, nor are the patterns of homespun complex enough to need it.

THE LACE INDUSTRY, the second great cottage industry of Ireland, is specially dealt with in another section of this work, and therefore need not be further noticed here.

HAND-KNITTING, in spite of the growing severity of the competition of the knitting machine, is still widely spread over the country, and is the means of bringing in earnings great in bulk if small from the point of view of the individual worker. The wild district of Kincasslough, in County Donegal, and Glenties, in the same county, are important centres of this industry. The Arran industry in County Mayo turns out elaborate and beautiful specimens of hand-knitting, and at Baronscourt (County Tyrone), Courtown (County Wicklow), and Howth (County Dublin), it is practised with a success which is, in no small degree, due to the market provided by the depots and sales of the Irish Industries Association.

HAND EMBROIDERY, in its more artistic developments, is still, fortunately, incapable of satisfactory imitation by machinery, and must rank in Ireland as a very considerable and by no means decaying industry. The so-called "Swiss embroidery" has, no doubt, largely killed some of the cheaper and poorer forms of white embroidery or "sprigging," but the better forms have shared in the benefit of the reviving taste for genuine hand-work in industrial art; and more exquisite work in colour than that which is produced, in obedience to a large and steady demand, by the Royal School of Art Needlework in Dublin, or the Garryhill, Turbotstown, Dalkey or Kenmare industries, it would be difficult to produce from any period of European art-history. The white embroidery and drawn-work produced for the large Belfast

firms, as well as at various independent centres throughout the country, such as Sligo, Ardara, Strabane, Ballintra, is also of most admirable quality in design and execution. In this whole department of Irish art-work it may safely be said that nothing approaching it for excellence is to be found anywhere else in the United Kingdom, and not very much even in France or Belgium. The splendid embroideries of the East, with their inimitable peculiarities of style and material, can hardly be said to come into fair comparison with European work, but any other comparison Irish art-needlework of to-day may safely endure.

As types of two different methods of industrial organization, the following account of the Royal Irish School of Art Needlework and of the Dalkey Embroidery Society may be quoted from the pens, respectively, of the Countess of Mayo and the Lady Betty Balfour.

The Countess of Mayo writes:—

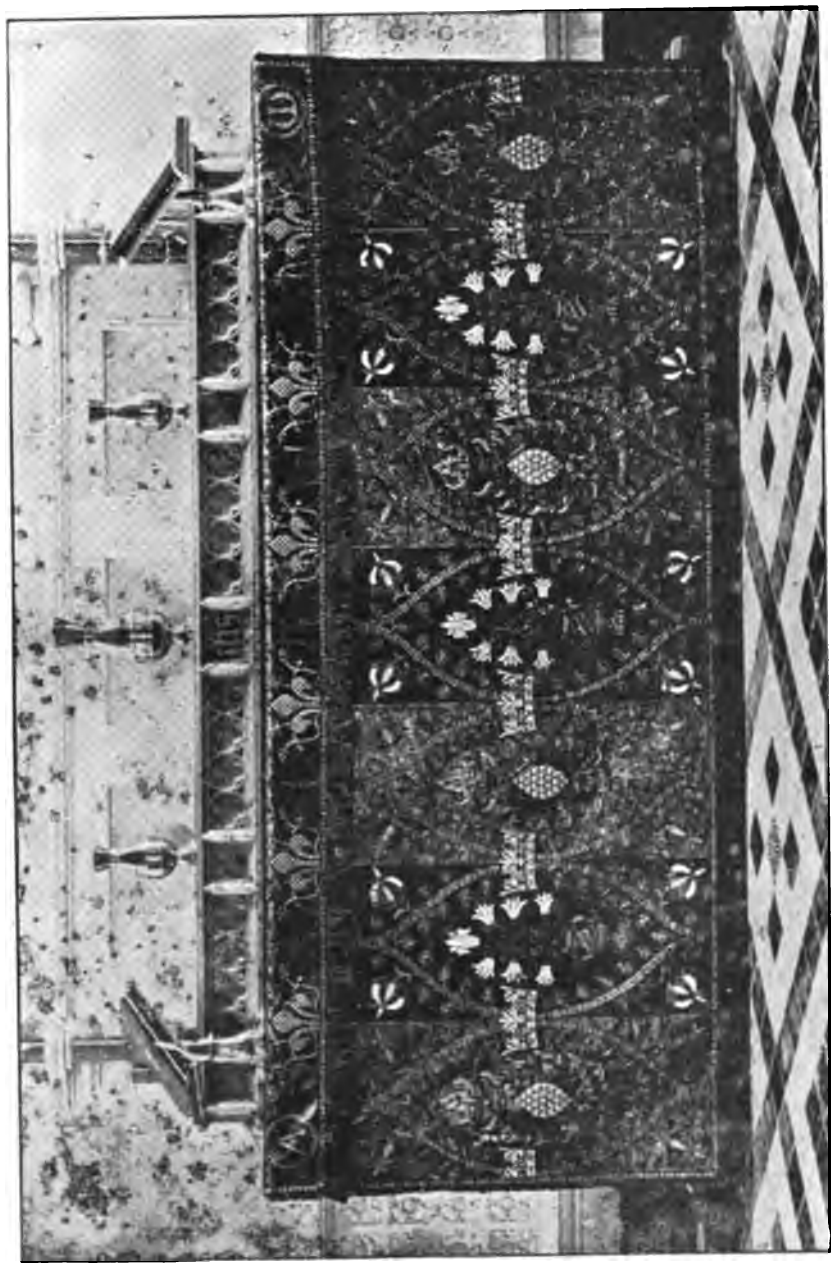
"I HAVE been asked to tell you the history of the School of Art Needlework, over which I preside, and I do so all the more gladly because to me needlework has ever held a special attraction.

Royal Irish School of Art Needlework.

I love those beautiful designs—those delicate traceries which adorn the wonderfully-wrought vestments, the quilts and the screens, to execute which (with marvellous and complicated stitches introduced) formed the principal occupation of the lady of the olden time. Her frame was her close and intimate companion, and these elaborate art pieces filled the long hours of solitude imposed upon her by her household tyrant. Who can say whether she was a whit less happy than we in our advanced freedom?

Another well-loved friend is the dear old sampler, made beautiful by the introduction of every possible combination of stitch, over which our grandmothers spent many weary hours and indulged in many a childish tear. The sampler went out of fashion some time in the thirties, and with its departure we must perforce associate the gradual decline in art needlework. Frames were hidden away in lumber-rooms; the covering of chairs and sofas with vile pieces of tapestry grounded in cross-stitch, took the place of the beautiful embroideries; and the making of crochet lace absorbed all attention!

This condition lasted over a long period, but light began once more to appear, and refined art needlework again came to the front. South Kensington Museum led the way in improving the standard of taste. Schools were established, and now there is every prospect that if the public will support the workers, art needlework will once more take its place in the front rank of Art. The School of Needlework in which I take so deep an interest owes its existence to the Countess Cowper, who, when in Dublin, as the wife of the Lord Lieutenant, was so much struck with the skill displayed in the production of embroidery by certain Irish ladies that she collected these ladies under one roof, and in 1874, with a committee to superintend the financial and business arrangements, inaugurated the "Royal Irish School of Art Needlework." The school worked well for some twelve years, and then the interest in it began to fail. There were many reasons why it was not so successful as it had been. In the first place, the times were out of joint, especially in Ireland. Money was scarce, and, above all, taste was still struggling in the quagmire of ignorance; while the fact that the Art



Altar Frontal, Executed by Royal Irish School of Art Needlework.



School had been started to relieve ladies who had suddenly become penniless gave to the undertaking an eleemosynary element fatal to success. The system under which the School was managed, moreover, was not found to work satisfactorily. At the same time it was felt that to close it entirely would be a great hardship to those ladies who for twelve years had been dependent upon it for their livelihood. It was, therefore, determined to re-organise the whole system, and to re-open a school upon a sounder financial basis. A small sum of money was collected as a starting point and for the purchase of stock, etc.; the affairs were carefully looked into, and, with a smaller executive committee, the new school was opened in 1894, with a paid manager and fourteen workers. Now, I am glad to say, we have twenty-three workers, and the embroidery that is sent out from our house will prove to future generations that the women of the nineteenth century are not behind those of previous times in the artistic and skilful use of their needle.

Any work that can be done by the needle we undertake to do, and in the best manner. Books embroidered on parchment or satin are a speciality, also church embroidery of all descriptions. I would particularly call attention to an Altar Frontal which we have lately finished, and which can now be seen in Kildare Cathedral. It is elaborately embroidered on alternate panels of cloth of gold and crimson damask (as in the illustration annexed), and I think I may say, without fear of contradiction, that it is about as good a specimen of artistic needlework as the present day can produce. An equally rich and elaborate frontal, with a figure of St. Patrick in the centre panel has been more recently made for St. Patrick's Cathedral, Dublin. Under the superintendence of our manager every description of needlework is executed. Patterns can be sent on approval, and we are always glad to receive orders for embroidered dresses for drawing-rooms, weddings, &c. I may add that we have access to many beautiful embroideries in the National Museums and in private collections. We are also in correspondence with some of the best designers of the day, so that we can copy or originate according to the wish of our patrons. In conclusion, I would put forward one more motive for giving support to such efforts as we are engaged upon. It is well known that nothing lowers the tone of the mind more than a low tone in the surroundings; and it will be remembered that it was the rule in Greek domestic life that no object in daily use, however lowly it might be, should be fashioned after a low or sordid type. In the poorest households the child's eye grew accustomed to forms of beauty and art, fashioned out of the rudest material. So let it be with us!"

Of the Dalkey Society, which is a co-operative institution, Lady Betty Balfour writes:—

"I happened not long ago to be with a party visiting one of the most successful new creameries in the West of Ireland. A fellow-visitor then made a criticism which struck me. It was to the effect that though, no doubt, these factories were beneficial to the trade of butter-making, they had to a large extent robbed the farmers' daughters of their home employment. The cows still had to

be milked, and the milk conveyed by one member of the family to the creamery, but the actual butter-making which was formerly carried on in each individual farmhouse, being now transferred to the creamery, the girls at home must sit with idle hands.

The reply seemed obvious. If the fathers had found the methods of co-operation unfailingly successful in the industries of butter-making, bacon-curing, the cultivation of flax, &c., why should not the daughters pronounce for themselves this 'open sesame' and co-operate on similar principles for such industries as dress-making, embroidery, needlework, millinery, artificial flower making, basket work, lace work, &c.

Surely no one will venture to say that where men have successfully combined for business-like purposes, women are incapable of doing so.

Under this system the skilful and capable girl need not wait for an employer, the willing but ignorant one for a teacher. Let them combine to procure the implements, materials, and technical training necessary for the production of a marketable article, and they will have secured for themselves a livelihood.

The suggestion that women as well as men should combine to work an industry under the new system has, in one case, already been most successfully tested.

The Co-operative Needle-work Society which has been started at Dalkey has set an excellent example to girls elsewhere in Ireland.

A number of girls who, in school and afterwards, had shown themselves capable of doing very highly-finished needlework, whose skill should have been to them a source of income, yet found themselves without the means of exercising their talents to profitable purpose. Manufacturers and other employers could not help them; it remained for them to help themselves. The friends of the co-operative movement, which was spreading so rapidly among the farmers of the country, came to their rescue. A meeting was held at the Convent of Dalkey, and a society was formed 'to develop and improve the general needlework and art embroidery in Ireland, to improve the moral and social status of the workers engaged in such occupations by imparting to them technical education in all branches of their business and obtaining a market for their work, and saving for them the profits derived from the sale.'

The Loreto Nuns at Dalkey blessed the enterprise, and gave the workers the use of a building in the convent grounds, which was fitted up as a workroom. One of the nuns undertook the management, competent teachers were secured, and the society was started in October, 1895.

The convent is beautifully situated at the edge of the sea, and the workers when they lift their eyes to the window can rejoice in the wide expanse of sea and sky looking out over the blue bay of Dublin.

Twenty-five workers are now employed there, but the number varies according to the amount of work on hand.

A small capital was subscribed to start the society, and it is now self-supporting.

Workers are not required, on entering the society, to pay anything, but they are all obliged to become shareholders. This they can do by allowing their share of profits to be devoted to the purchase of their shares till they are fully paid up. This does not, however, diminish in any way their ordinary wages.

The workers are paid according to the amount and quality of their work. The profits of the society, as ascertained when the accounts are made up at the end of each half-year, are divided among the workers in proportion to the wages that each has earned during the time.

A committee is elected by the members of the society, and the rules for hours of labour and the general conduct of business are made by the committee. A member cannot be dismissed for any cause whatsoever except by a vote of the whole society.

Before a worker is admitted a member of the society she must first enter the workroom as an apprentice, or as a paid hand. If she does not prove herself capable and industrious she will not be admitted into the society.

The work I myself saw at Dalkey comprised plain needlework, simple dressmaking, and embroidery. This last was certainly the most important work of the place, and the orders executed were, I noticed, almost entirely for ecclesiastical purposes. The embroidery of some of the vestments showed the most exquisite workmanship. A magnificent cope, ordered by the Countess of Aberdeen, and executed at Dalkey, attracted general attention at the Horse Show in 1896. Side by side with this beautiful church work it would be satisfactory to see more orders from lay members of the community. As soon as the society becomes more generally known ladies will doubtless send orders there for their dresses, and lovers of beautiful embroidery would render a service by sending good designs to be worked out for curtains, piano covers, screens, table cloths. I should also like to recommend the Dalkey workers to those who know not where they can get their handkerchiefs cheaply and prettily marked. The specimens of this kind of work which I saw there were admirably done.

The Dalkey society has prospered continuously since it was started, and the work is good enough to need no extraneous advertisement or help. It is not therefore so much for the good of this Society that its work and history need be put before the public, but rather for the purpose of holding it up as an example which I trust will be speedily followed by others, and in the hope that similar societies may soon be started in all parts of Ireland where the need for self-help is great, and where poverty is the result of a dearth of employment and not of an absence of skill. This result, above all others, would be gratifying to those who have so effectually watched over the infancy of the Society of Needleworkers at Dalkey."

Since the foregoing account was written the work at Dalkey has attained notable developments. The department of ecclesiastical embroidery has increased its workers, their training has been perfected, and their work can more than hold its own against the imports from Lyons and Rome.* An altar frontal ordered by Her Excellency

* The fruit of the excellent art training given is now being reaped in the very beautiful designs which the workers are able to draw for themselves and afterwards to carry out in embroidery. This union of art and craftsmanship, so much to be desired and aimed at in the technical education of our people, has already been attained here with the happiest results.

The underclothing department has secured the services of some of the best workers of the North of Ireland, always famous for their skill in plain needlework, and during the past winter many important orders for trousseaux have been most satisfactorily carried out, notably part of the trousseau of Miss Cornwallis West.

Countess Cadogan was exhibited by the Society at Her Excellency's Textile Exhibition in Dublin, 1897.

Besides the above, the work of the Kenmare, Garryhill, and Turbotstown industries, under the care, respectively, of the Convent of Poor Clares, the Viscountess Duncannon, and Mrs. Dease, has formed a notable feature at the exhibitions of the Royal Dublin Society and the Irish Arts and Crafts Society, and has set up a standard of taste in design and excellence of workmanship which is of much value to the industries dealing with simpler forms of art-needlework. The industries at Marlfield (Clonmel), conducted by Mrs. Bagwell, and at Ennis (the Little Sisters of the Poor), and at Gort (Sisters of Mercy), turn out children's frocks, aprons, &c., in excellent style, with simple, yet dainty and artistic ornamentation, and rich vestments are also made at Gort.

BESIDES the art and cottage industries already mentioned, there are others which are carried on in Ireland with more or less success, but, so far as concerns the production of genuine

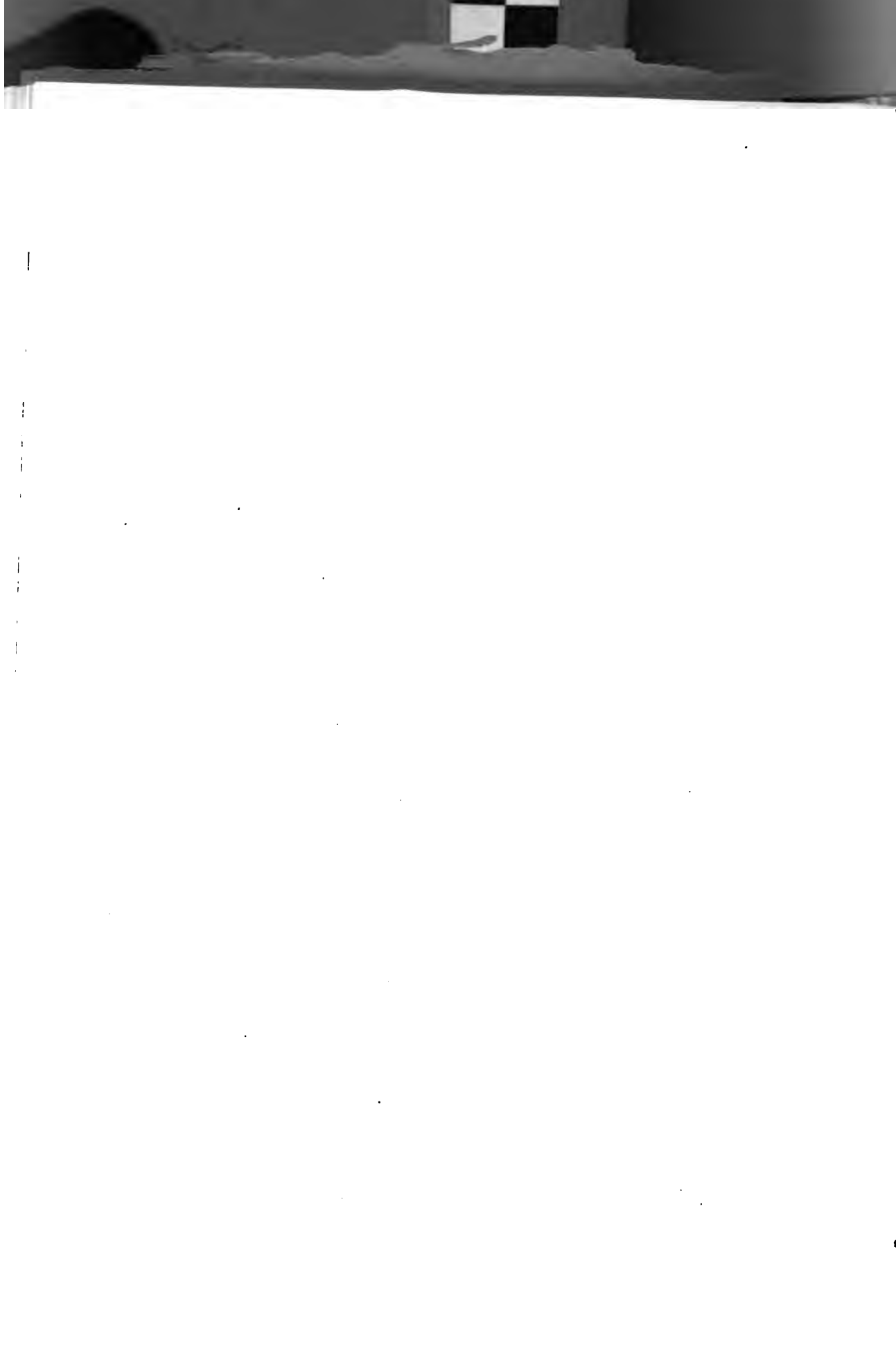
Other Art Industries. works of art, on a comparatively small scale.

Among these are stained glass, wood-carving, bookbinding, hand-made carpets, wrought-iron, repoussé brass and copper work, cabinet-making, basket-work, pottery. The STAINED GLASS from Belfast exhibited at the Arts and Crafts Exhibition (Dublin) of 1899 was considered by Mr. Harold Rathbone, who wrote the official report of the Exhibition for the Committee, to show very remarkable merit in drawing and colour. The great ship-building works in Belfast provide much local employment for WOOD CARVERS, LEATHER WORKERS, PYROGRAPHERS, &c., and a high standard of technique is thereby generally attained, though in original designing power and capacity for dealing with figure-subjects Dublin is ahead. Artistic BOOK-BINDING of a high class is done on a small scale in Belfast; but on the whole, this industry, which might so suitably employ the taste and skill of Irish workers, must be admitted to be in a backward condition in this country. Hand-tufted CARPETS of excellent quality have lately been made at Killybegs, Co. Donegal, under the auspices of Messrs. Morton, of Ayrshire. WROUGHT-IRON is made in Belfast and in Dublin, and, as fine specimens of the achievements of these cities in this direction the visitor to Ireland may be referred to the barrier of the station of the Belfast and Northern Counties Railway in Belfast, and to the entrance gate of the Science and Art Buildings, Kildare-street, Dublin. The industry of REPOUSSÉ BRASS AND COPPER WORK has attained so remarkable an artistic development at Fivemiletown, Co. Tyrone, that we may give some details of its origin.

Cottage Industries have flourished in Fivemiletown for several years under the direction of Mrs. Montgomery, of
The Fivemiletown Industries. Blessingbourne, who has organised embroidery and sewing classes for girls. Mrs. Montgomery

determined to extend the scope of her work, and to find occupation to which the young men as well as the young women of Fivemiletown could devote their spare hours. She went to London in 1891, and placed herself under the tuition of a lady teacher in repoussé metal work, who had been recommended to her by the Home Arts and Industries Association, and by the Spring of 1892 she was able to start an art metal work class at Fivemiletown itself.



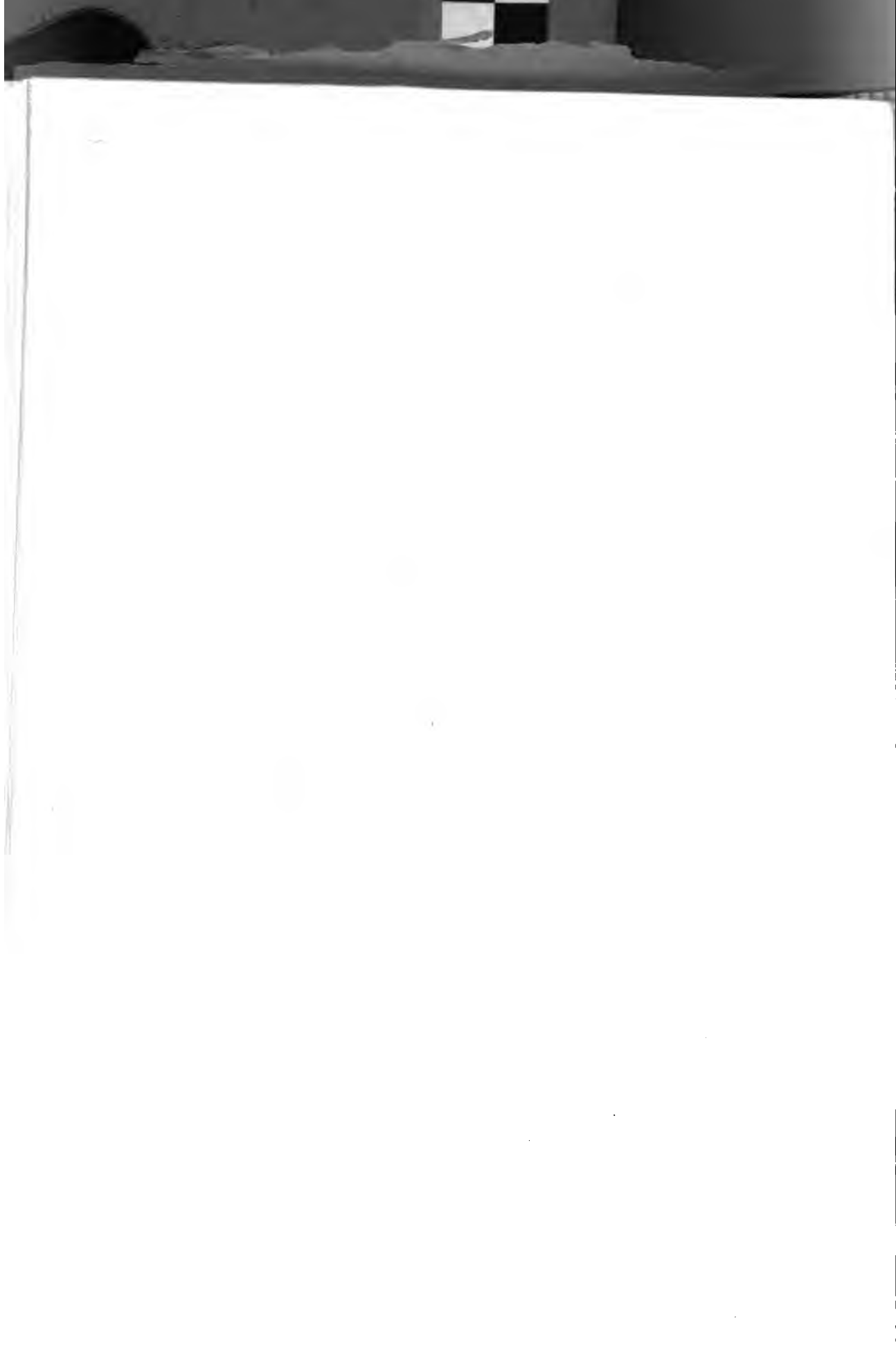




Newspaper Holder in Repoussé Brass Work, made at Fivemiletown, Co. Tyrone.



Dish in Repoussé Copper, made at Fivemiletown, Co. Tyrone.



She was at first the only teacher, but was soon most ably seconded by Mr. Wilson, the manager of the Fivemiletown branch of the Northern Bank, whose children also showed an extraordinary aptitude for the work.

The Home Arts and Industries Association supplied some of the designs, others were furnished by Mr. H. de F. Montgomery himself, others again were worked up by Mr. John Williams, their main characteristics being flowery forms of a bold, conventional treatment, which were mainly derived from Persian and Gothic sources. Some again were adapted from old 15th century patterns, others were original. The result was that the Fivemiletown Class made a very creditable show at the Home Arts and Industries Exhibition at the Albert Hall in June, 1893, and succeeded in winning a gold star for designs by Mr. Montgomery, and another for workmanship earned by Mr. Patrick Roche. This was, however, but a beginning, and the reputation thus earned by the Fivemiletown Class stirred up strangers to take an interest in its further development. Mr. John Williams, then Art Teacher to the Surrey County Council, now head of the Art Department at the Northampton Institute, in Finsbury, spent part of his autumn holidays that year at Fivemiletown, where he was able to enjoy the beauties of the Clogher Valley in the morning, and to devote his evenings to developing the artistic faculties of the workers. His visits, repeated in 1894 and 1896, have done much to raise the standard of the work to a high pitch of artistic excellence. Three examples of the art metal work of Fivemiletown are illustrated in the accompanying plates.

The Fivemiletown repoussé earned the most favourable notice and the warmest praise at many exhibitions in 1895 and 1896, more especially at the Home Art and Industries Exhibition at the Albert Hall, and the Exhibition of Arts and Industries, held by the Royal Dublin Society at the same time as the Dublin Horse Show at Ballsbridge. In fact, one of the judges at the latter exhibition gave expression to the opinion that he had seldom seen modern work approach so high a standard of excellence.

As regards CABINET-MAKING for which Dublin was once so famous, it may be said that as an art industry (save in the sense of skilful reproduction of Chippendale and Sheraton work), it hardly exists in Ireland, except in one locality—Killarney. Here, however, a School of Arts and Crafts, founded by the Viscountess Castlerosse, and skilfully utilizing the artistic traditions of the place, has lately been producing work of the greatest promise, in the shape of decorated bedsteads, chairs, tables, and other articles of woodwork, great and small, simple and elaborate. These are all alike marked by a peculiar tastefulness and grace of design, and they put it in the power of the visitor to Killarney to obtain a fitting memento of his visit to that enchanted region.

BASKET-WORK of an ornamental as well as useful character is carried on at Letterfrack, Co. Galway, Beaufort, Co. Kerry, and Castlecomer, Co. Kilkenny. Much ingenuity and taste are displayed in adapting wicker-work to various purposes, but these industries have suffered hitherto from the lack of native-grown osiers of the right quality—a need which steps are being taken to supply.

The BELLEEK POTTERY ware, which has been made so popular by its characteristic lustre and tint, is the one pottery industry of any considerable extent in Ireland. A good selection of its products is included in the Irish Pavilion at the Glasgow Exhibition.

Finally, we may mention the ILLUMINATING and ENGRAVING work, of which Ireland can furnish some admirable specimens. A book plate by Mr. John Vinycomb, M.R.I.A., is here reproduced as evidence of the manner in which the traditions of this art are maintained in Belfast.



by John Vinycomb

Book-plate by Mr. John Vinycomb, M.R.I.A., Belfast.





Launch of the SS. "Celtic."

THE SHIPBUILDING INDUSTRY IN BELFAST.

The success of the shipbuilding industry in Belfast is a striking proof of what industry and perseverance can accomplish. With few natural advantages—for in this part of the United Kingdom neither coal nor iron is found—and with a comparatively small foreign trade, the spirit and enterprise of the people of Belfast has enabled them to excel in two branches of industry, linen and shipbuilding. These industries, though apparently but remotely connected, have this common factor—that they both demand skill and care in design and execution. It may be noted here that, though the connection between these industries is not, as we have said very apparent, much of their success is due to the fact that they have become subsidiary to each other—the non-competents for one industry finding occupation in the other. Thus while the male part of the community are engaged in shipbuilding and kindred industries, the female and child labour is absorbed in the local textile trade.

Shipbuilding began in Belfast, as elsewhere, with the building of wooden ships. As far as is known the first vessel was launched in 1636. The ship was of some 150 tons, and was, it is said, intended for a privateer, her owner, strange to relate, being a Presbyterian clergyman.

In the year 1682 the largest Belfast ship was the "Antelope," a Virginian trader of 200 tons register. In 1700 the "Loyal Charles" of 250 tons burden was launched; but up to 1791 there was no regular place for laying down a vessel. In the early part of the nineteenth century some 50 or 60 vessels were built, the largest being the "Hindoo" of about 450 tons burden. The first iron ship built in Belfast was the "Seagull," in 1844, by Messrs. Coates and Young, but iron shipbuilding as an industry did not begin until 1850, when the Belfast Iron Works was opened by Messrs. Barnes and Co. In 1853 Messrs. R. Hickson and Co., of Queen's Island, "laid down" a large vessel—the "Mary Stenhouse"—the first built on the Island. Messrs. Hickson continued their business with great and growing success until in 1858 their firm—and that of the Belfast Shipbuilding Co.—was acquired by Mr. Edward Harland, the founder of the famous firm of Messrs. Harland and Wolff. Such has been the energy and enterprise of this company that from 100 hands in 1858, the number of persons employed has increased to over 9,000, and the amount of tonnage turned out by the firm during the past seven or eight years exceeds the production of any other yard in the world. In this connection the following figures are interesting. Messrs. Harland and Wolff turned out tonnage to the amount of 81,316 tons in 1896, 84,240 in 1897, 67,905 in 1898, 82,634 in 1899, and last year they launched six vessels of an average tonnage of over 11,000 tons.

Among the many ships built by this firm are the Teutonic and Majestic, the Gothic, the Cevic and the Georgic, indeed they have built the entire fleet (44 ships) of the famous White Star Line.

Messrs. Harland and Wolff were the first to introduce the long style of ocean steamship with saloon and first-class passenger accommodation amidships in the Oceanic, the first vessel built for the White Star Company, and which was completed at the end of 1870. This vessel inaugurated an entirely new type of ocean steamer, and was indisputably the origin of most of the improvements in the internal accommodation of Atlantic passenger steamers, thus constituting Messrs. Harland and Wolff the pioneer builders of vessels of great length and extraordinary speed.

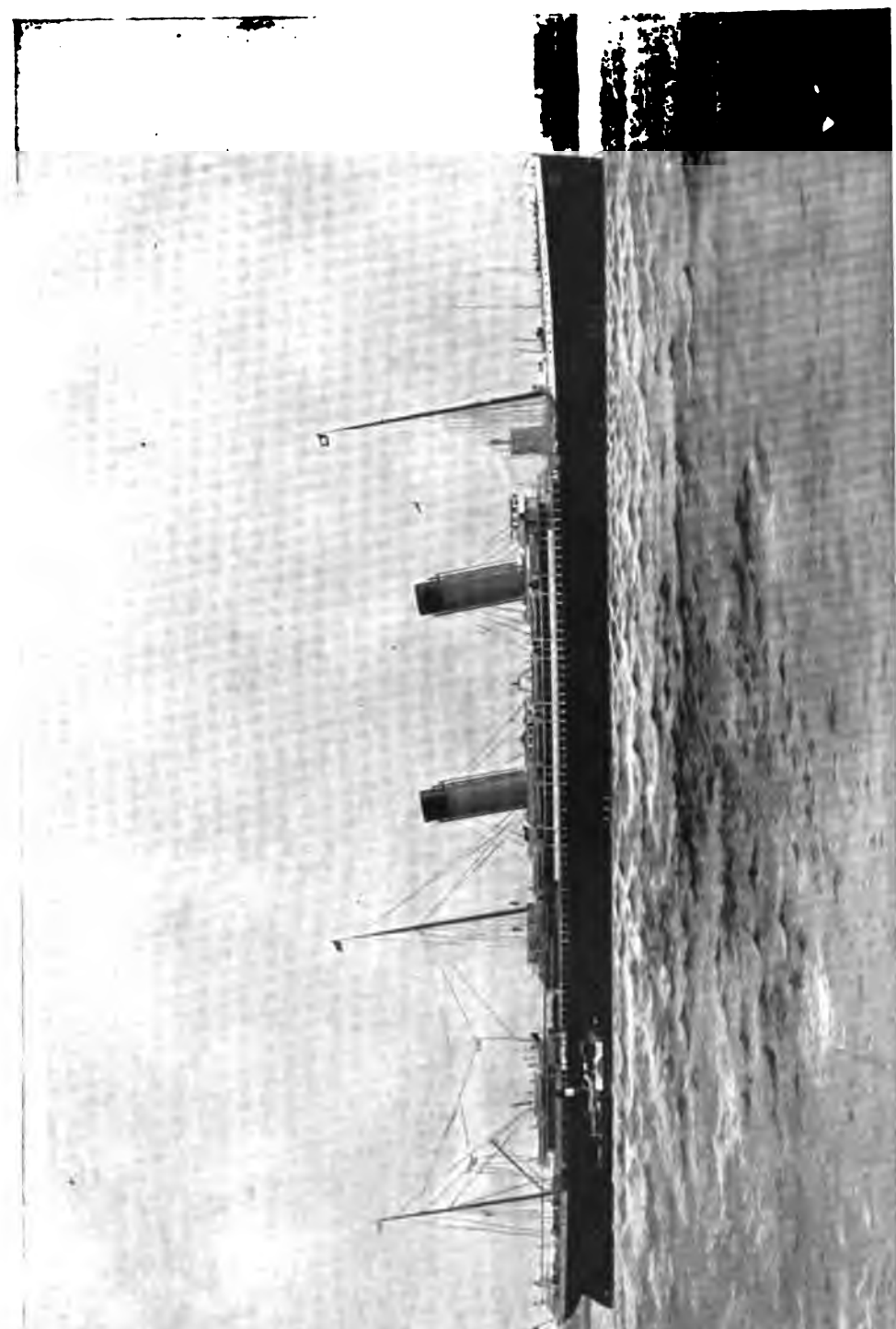
The two great achievements of these shipbuilders, however, was the successful launch and completion of the new White Star passenger and mail steamers Oceanic and Celtic. The Oceanic's dimensions even exceed the Great Eastern's. The Oceanic is 704 feet long, and at the time of her launching was universally acknowledged to be the finest vessel ever produced, and the crowning success of the century in naval architecture and marine engineering, reflecting the highest credit alike on the enterprise of her owners and the capacity of her builders. The only matter for regret is that Mr. Thomas H. Ismay, the founder, and until his death the head of the White Star Line, should have passed away within a few months of the completion of this splendid addition to his already celebrated fleet.

This splendid ship, huge though its size, has been surpassed by the Celtic, launched on the 4th April this year. The length of the Celtic is given as 700ft. over all; she is, therefore, a few feet shorter than the Oceanic, though still ahead of the Great Eastern. In breadth she is 75ft.—7ft. more than the Oceanic, but about the same amount less than the Great Eastern. It is this breadth of beam that makes her so much bigger than the Oceanic, while she surpasses the Great Eastern because a section of her amidships would be approximately a square, whereas in Brunel's boat it was approximately a triangle.

The Celtic has not been designed with any view of attaining high speeds; her claim to distinction lies rather in the fact that she is the biggest boat that ever has been built or is now in process of construction. The only vessel in the past that approached her was the Great Eastern, which had a gross tonnage of 18,915 compared with her 20,880.

Second in importance to Messrs. Harland and Wolff is the firm of Messrs. Workman, Clark and Co., but though they only take second place in Belfast, they are one of the largest shipbuilding firms in the world.

This firm commenced business in 1879 on the north side of the river, and have ever since been improving their status in the shipbuilding world, their name now standing among the first shipbuilders of the United Kingdom. In a short time after this successful venture they extended their works to the south side of the river. The increase of output, however, has compelled them to add considerably since then to the capabilities of both yards, and to take over the property of Messrs. M'Ilmaine and MacColl, Ltd., so that the firm possesses at the present time no less than five separate establishments. The equipments are all up-to-date, and calculated



The White Star R.M.S. "Oceanic."







are expedition in attending to the various orders received. In instance of this, it may be stated that the yards are complete in slips for taking ten ships at one time. Large engine and shops have been constructed for the building of machinery, these are replete with every facility for efficiently dealing with work required. Since the founding of the firm they have built 5 ships, cargo and passenger steamers of from 200 to 11,000 although during late years they have confined themselves to vessels approaching the latter size. Among the steamship companies for whom Messrs. Workman, Clark, and Company have, at various times, constructed steamers are the Cunard Steamship Company, the Allan Line, the West India and Pacific, the Ocean Steamship Company, the Norddeutsche Lloyd, the Hamburg-American Line, the City Line, M. and J. Harrison, Houlder Bros., and Company, Limited, the China Mutual Steam Navigation Company, and others, including local shipowners. These facts demonstrate the great success and growing importance of the firm, and the energy displayed by them will undoubtedly develop the business to even greater magnitude.





DEPARTMENT OF AGRICULTURE AND TECHNICAL
INSTRUCTION FOR IRELAND.

GLASGOW INTERNATIONAL EXHIBITION.

IRISH PAVILION.

OFFICIAL LIST OF EXHIBITORS AND EXHIBITS.





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IRISH PAVILION.

OFFICIAL LIST OF EXHIBITORS AND EXHIBITS.

HALL.

Name of Exhibitor.	Address of Exhibitor.	Nature of Exhibit.
1. Ward and Partners, ...	Belfast, ...	Coloured and Leaded Panels in porch door, representing St. Patrick and St. Bridget.
2. Do., ...	Do., ..	Stained Glass Panel in Office door, suitable to domestic purposes.
3. Musgrave and Co. (Ltd.),	Do., ...	Screen in Leaded Glass, representative of Industry. Musgrave's Patent Slow Combustion Ventilating Stove.
4. Sir Douglas Brooke, Bart.,	Colebrooke, Brookeboro',	Heads of Irish Red Deer.
5. T. M. Carthy, ...	Angler's Rest, Waterville,	Salmon and Trout Flies, suitable to all localities.
6. P. W. Anketell Jones, ...	Currarvagh, Oughterard,	Trout.
7. Capt. Anketell Jones, ...	Innishamboo, Oughterard,	Pike from Lough Corrib.
8. W. J. Thomas, ...	Mullingar, ...	Specimen Trout from Lough Ennell

ROOM No. 1.

9. Collective exhibit of Cottage Industries as applied to Linen Fabrics, from the counties of Armagh, Antrim, Down, Donegal, Londonderry.	Belfast, ...	{	Fine specimens of Hand Embroidered Linens and Cambrics, and Hand-woven Damasks.
Joint exhibit, kindly contributed to by Belfast Linen Merchants Association:— York Street Flax Spinning Co. (Ltd.); Richardson, Sons, and Owden; John Shaw Brown and Sons; Henry Matler and Co. (Ltd.); Lindsay Thompson and Co. (Ltd.)			
10. Hicks, Bullick, and Co.,	Do., ...		Sewing Cottons, Crochet Cottons, Threads, including Shamrock, Harp, and Round Tower Brands.
11. Walpole Brothers, ...	Dublin, ...		Hand Embroidered Linen Bedspreads, Tray Cloths, Tea Cloths, D'Oyleys, &c. Hand Loom Double Damask Table Cloth and Napkins.
12. Ward and Partners, ...	Belfast, ...		Coloured Window—subject, Christ at Carpenter's Bench.

ROOM No. 2.

Name of Exhibitor.	Address of Exhibitor.	Nature of Exhibit.
13. Letterfrack Basket Industry.	Letterfrack, Co. Galway.	All kinds of Basket Work, including the Shamrock and Spinning Chair patterns, as supplied to Her late Majesty Queen Victoria. Baskets.
14. Miss Reeves,	Tramore, Douglas. Co. Cork.	
15. Mrs. Nash,	Beaufort R.S.O., Co. Kerry.	All kinds of Basket-work, including wicker-covered bottles.
16. Castlecomer Basket Industry.	Castlecomer.	All kinds of Basket-work.
17. Hamilton & Co.,	White House, Portrush.	Bog-oak Carvings.
18. Millar & Beatty,	Dublin,	Donegal Carpet.
19. Do.	Do.,	Section of Carpet as supplied to Her late Majesty Queen Victoria. Both specimens made at Killybegs, Co. Donegal.
20. Killarney Furniture Industry.	Killarney, Co. Kerry, ...	Furniture, including Bedstead, Dressing Table, Chairs, Fire Screen, Brackets, Hand Glass, Table, Candlesticks.
21. Fry & Co.,	Dublin,	Poplin Curtains.
22. Royal Irish School of Art Needlework.	20, Lincoln-place, Dublin,	Bedspread on Bed.
23. Hamilton & Co.,	White House, Portrush,	Hand-painted Toilet Set in Belleek ware.
24. Mrs. Montgomery,	Blessingbourne, Fivemile-town.	3 Panels for mantelpiece, Coal Scuttle and Fender, 2 Copper Sconces.
25. Miss Alice Shaw,	Mount Saville, Terenure, Co. Dublin.	Panels in green wood (Celtic carving).
26. William Coates & Son,...	Belfast.	Electro-plated Standards.
27. J. Johnston Inglis, R.H.A.,	Montrose, Donnybrook,	Views of Irish Scenery.
28. E. and L. Taddei,	Cork,	Irish Marble Ornaments.
29. Alex. Hogg,	13, Trinity-street, Belfast.	Flash-light Photographs.
30. John Vinycomb,	Hollywood, Co. Down, ...	Engravings of Book Plates.
31. Hamilton & Co.,	White House, Portrush,	Selected specimens, fine Belleek Pottery.
32. Mrs. G. B. Power,	Kilfane Glebe, Thomas-town, Kilkenny.	Wood Carving, including Cabinet, Coal Box, and Tray.
33. Edmund Curry,	Abbeyleix, Queen's Co.,	Marriage Chest, copied from original in Victoria and Albert Museum.
34. Miss Alice Shaw,	Mount Saville, Terenure, Co. Dublin.	Carved Spinning Chair, Cupboard, 5 Panels for Dado in mahogany.
35. T. Dillon,	Galway,	Connemara Marble Ornaments.

ROOM No. 3.

36. Irish Lace Depot, Ltd.,...	76, Grafton-street, Dublin.	Representative exhibit of Irish Lace and Crochet from twenty Counties.
37. Presentation Convent,...	Killarney,	Specimens of Carrickmacross and Limerick Lace.
37B. Castlebellingham Home Industries Society.	Castlebellingham, Co. Louth.	Carrickmacross Appliqué and Guipure.



Name of Exhibitor.	Address of Exhibitor.	Nature of Exhibit.
Israel Holland, ...	20, Myrtle Hill Terrace, Cork.	Crochet Collarettes, Crochet Frontal in silk and gold. Specimens of Insertion and Lace, designed by Exhibitor, and worked under his supervision.
Meath Home Industries,	Navan, Co. Meath, ...	Crochet Sleeves.
Convent of Mercy, ...	Queenstown, Co. Cork,...	Specimens of Carrickmacross Lace and Crochet.
Swords Lace Class, ...	Swords, Co. Dublin, ...	Carrickmacross Lace.
Irish Needlework Depot,	Dawson Street, Dublin,...	Crochet Collars.
Department of Agriculture Technical Instruction Ireland.	Dublin, ...	Torchron Lace Worker.
Ward and Partners, ...	Belfast, ...	Stained Glass Window, representing Monasterboice Cross, with Arms of the four Provinces, and Cities of Dublin, Belfast, Cork, and Galway.

ROOM No. 4.

Garryhill Cottage Industry.	Garryhill, Co. Carlow, ...	Selected specimens of White and Coloured Embroidery.
Meath Home Industries,	Navan, Co. Meath, ...	Embroidery.
Mrs. Knox, ...	Creagh, Ballinrobe, ...	Do.
Mrs. Hamilton, ...	Brownhall, Donegal, ...	Do.
Turbotstown Cottage Industry.	Coole, Westmeath, ...	Do.
Crawford Municipal School of Art.	Cork, ...	Art Embroidery.
Ardara Drawn Work Class.	Ardara, Co. Donegal, ...	Drawn Work and Embroidery.
Convent of Mercy, ...	Ennis, Co. Clare, ...	Embroidery.
Dalkey Co-operative Needlework Society.	Dalkey, Co. Dublin, ...	Gold Embroidery.
Worker—Do. do., ...	Do., ...	Gold Embroiderer.
Irish Industries Association.	21, Lincoln Place, Dublin,	Embroidery.
Miss Reeves, ...	Tramore, Douglas, Cork,	Silk.
W. J. Davidson, ...	Grey Abbey, Co. Down,...	Do.
Convent of Mercy, ...	Queenstown, Co. Cork, ...	Linen.
Do., ...	Roscarbery, Co. Cork, ...	Linen and Cambric.
Do., ...	Skibbereen, Co. Cork, ...	Do.
Dunloe Co-operative Flax Society.	Dunloe, near Coleraine,	Flax Trophy.
McCreery and Son, ...	Albert Bridge Road, Belfast.	Spinning Wheels.
Ward and Partners, ...	Belfast, ...	Stained Glass Window, representing Monasterboice Cross, with Arms of the four Provinces, and Cities of Dublin, Belfast, Cork, and Galway.

COURT.

Name of Exhibitor.	Address of Exhibitor.	Nature of Exhibit.
58. Great Northern Railway Company (Ireland).	Dublin,	Photographs of Scenery on Company's System.
59. Great Southern and Western Railway Company.	Do.,	Do. do.
60. Midland Great Western Railway Company.	Do.,	Do. do.
61. Belfast and Northern Counties Railway Company.	Belfast,	Photographs of Scenery on Company's System, also Types of Engines and Carriages used on the System.
62. Cork, Bandon, and South Coast Railway Company.	Cork,	Photographic Views of Scenery in Co. Cork.
63. Dublin, Wicklow, and Wexford Railway Company.	Dublin,	Photographs of Scenery on Company's System.
64. Ismay, Imrie & Co. (White Star Line).	Liverpool,	Model of Twin screw s.s. "Georgia."
65. London & North Western Railway Company.	London,	Full model s.s. "Anglia" (Dublin and Holyhead), speed 21½ knots.
66. Do.,	Do.,	Full model s.s. "Galtee More" (Holyhead and Greengore), speed 18½ knots.
67. The Barrow Steam Navigation Company.	Barrow-in-Furness,	Full model s.s. "Duchess of Devonshire" (Cross Channel).
68. G. and J. Burnes,	Glasgow,	Full model R. M. S. "Adder," tonnage 981, speed 19 knots.
69. City of Dublin Steam Packet Company.	Dublin,	Model of Mail Steamers "Ulster," "Leinster," "Munster," and "Connaught," each with a tonnage of 3,000, speed 24 knots.
70. Do.,	Do.,	Model s.s. "Louth," passenger and cargo, tonnage about 1,270, speed 15 knots (Dublin and Liverpool).
71. Dublin and Glasgow Steam Packet Company (Duke Line).	Do.,	Model s.s. "Duke of Rothsay," tonnage 1,225, speed 16 knots.
72. Do.,	Do.,	Model s.s. "Duke of Fife," tonnage 1,110.
73. City of Cork Steam Packet Company.	Cork,	Full model s.s. "Innisfallen" (Cork and Millford).
74. Lancashire and Yorkshire Railway Company.	Manchester,	Full model Mail s.s. "Duke of Cornwall" (Fleetwood and Belfast).
75. Larne and Stranraer Joint Steamship Company.	Belfast,	Full model Paddle s.s. "Princess Victoria."
76. Cork Steamship Company, Limited.	Cork,	Half Model s.s. "Cornwall," tonnage 1,591, speed 11½ knots (Liverpool and Antwerp).
77. Alex. A. Laird & Co.,	Glasgow,	Half Model s.s. "Fern," tonnage 510, speed 12 knots.
78. British and Irish Steam Packet Company.	Dublin,	Half Model s.s. "Lady Roberts," tonnage 1,642, speed 13 knots.
79. Sir John Power & Son, Distillers.	Do.	Manufacture of Whiskey—Material and Process.
80. Musgrave & Co.,	Belfast,	Model of Musgrave's Stable, consisting of 3 stalls and 2 loose boxes.

Name of Exhibitor.	Address of Exhibitor.	Nature of Exhibit.
...rave & Co., ...	Belfast, ...	Ulster Ventilating Fan.
... & Partners, ..	Do., ...	Window in Leaded Glass.
Agricultural Organ- isation Society.	Dublin, ...	Map showing, Co-operative Societies, Agricultural Banks, and Home Industries Societies affiliated to the I.A.O.S.
... Glanville, .	Do., ...	Polished specimens of fourteen different Irish Marbles.
... Congested Districts Board for Ireland.	Do., ...	Specimens of Copper, Lead, Iron, Sulphur, Marble, Granite.
I. Prior Wandesforde,	Castlecumber, ...	2 specimens of Anthracite Coal.
Col. B. Geale Hum- frey.	Cavanacoe, Ballindrait, Co. Donegal.	Granite, rough and polished.
... J. & F. Grant, ..	Kieselguhar Mines, Toome Bridge, Co. Antrim.	Diatomite (non - conducting material).
A. Watson & Co., Ltd.,	Liverpool, ...	Paving Materials and Bricks from Co. Clare.
... the Earl of Leitrim,	Mulroy, Milford, Co. Donegal.	Specimens of Grey Granite and Plumbago.
... Patrick Quinn, ...	Mount Charles, Co. Done- gal.	Specimens of Free-stone and Granite.
... Lord Monteagle of Brand- on.	Trenchard, Foynes, Co. Limerick.	Specimens of Lime-stone from Foynes, Co. Limerick.
Antrim Iron Ore Com- pany, Ltd.	Belfast, ...	Specimens of Broughshane, Park- more, and Glenarm Iron Ores; and Aluminous Ore.
Magheramorne Lime Company.	Magheramorne, via Bel- fast.	Specimen of White Lime-stone for quick lime: Flint used for pottery.
The Arigna Mining Com- pany, Ltd.	Ballinamore, Co. Leitrim.	Specimens of Coal, Iron Stone and Ore, Fire Clay, Flag Stones, and Building Stone.
... The Granite Quarries Company, Ltd.	Black Sod Point, Co. Mayo.	Granite Kerbs and Sets.
... J. M'Auliffe, ...	Rathmullen, Co. Donegal.	Oxide of Iron for Gas Purifying.
... Donegal Soap Stone Syndicate, Ltd.	Manchester, ...	Samples of Soap Stone, as mined at Crohy Head Mines, Donegal.
9. James C. Woodside, ...	Ballycastle, Co. Antrim.	Lime-stone and Square Sets.
100. Benduff Slate Company,	Rosscarbery, Co. Cork, ...	Slates.
101. Valencia Slate and Slab Quarries	Valencia Island, Co. Kerry.	Slate Slabs, Roofing, and School Slates.
102. The National Industries of Ireland Corporation, Ltd.	13, Abchurch Lane, Lon- don.	Flag Stones, Paving Sets, Kerb Stones, Building Stones, Coal and Iron Stones.
103. Major-General Treden- nick.	Ardara, Co. Donegal, ...	Specimen of Lead.
104. Colonel Courtenay, ...	Galway Town, ...	Columns and Slabs of Galway Granite.
105. John Bracken, ...	Cashel Lodge, Lanesboro',	Building Stone.
106. Department of Agricul- ture and Technical Instruction for Ireland	Dublin, ...	Fisheries.
107. The Congested Districts Board for Ireland.	Do., ...	Models, &c.
108. The Atlantic Oyster	Letterfrack and Oran-	Collection of specimen Oyster

ANNEX No. 1.

Name of Exhibitor.	Address of Exhibitor.	Nature of Exhibit.
109. R. Henry M'Keon, ..	Leenane, Killary Bay, Co. Galway.	Costume Cloths, Tweeds, Homespuns, Friezes, Rugs, and Blankets.
110. Spamount Woollen Co.,	Castlederg, Co. Tyrone,...	
111. J. Cogan and Son, ...	Midleton, Co. Cork, ...	
112. Hamilton and Co., ...	White House, Portrush.	
113. Convoy Woollen Mills,	Convoy, Co. Donegal, ...	
114. S. Heaton and Sons, ...	Lough Mills, Athlone, ...	
115. O. J. Sheehan and Sons,	Dungarvan, Co. Waterford.	
116. Cormick Cannon, ..	Glenties, Co. Donegal, ...	
117. James Timony and Co.,	Donegal,	
118. Nell M'Nelis,	Ardara, Co. Donegal, ...	
119. John Magee and Co., ...	Donegal,	
120. Andrew Heekin,	Carrick, Co. Donegal, ...	
121. Nicholas Dunne, ..	Avoca, Co. Wicklow, ...	
122. Henry L. Copeland, ...	Ballymore-Eustace, Co. Kildare.	
123. John Hanly,	Ballyartella Mills, Nenagh, Co. Tipperary.	
124. Mulcahy, Redmond, and Co.,	Ardfinnan, via Cahir, ...	
125. Gort Home Industries,	Gort, Co. Galway, ...	
126. Providence Woollen Mills,	Foxford, Co. Mayo, ...	


ANNEX No. 2.

127. Miss Roberts, ...	Kincassalough, Beleruit, Co. Donegal.	Hosiery.
128. D. & H. McDevitt, ...	Glenties, Donegal, ...	Hand-knit Hosiery and Gloves.
129. Kerry Knitting Company,	Tralee, Co. Kerry, ...	Hosiery and Underclothing.
130. Walpole Brothers, ...	Dublin,	Damask Loom, weaving Napkins.
131. Hamilton & Co., ...	White House, Portrush,	Spinner and Hand Loom, weaving Homespuns.
132. Department of Agriculture and Technical Instruction for Ireland	Dublin,	Specimens of Kelp and Tobacco.
133. C. Westerman, ...	Caledon, Co. Tyrone, ...	Carpets, Rugs, &c.
133A. Fry & Co.,	Dublin,	Poplin, Terry, Brocatelle, and Carriage Trimmings.
133B. Department of Agriculture and Technical Instruction for Ireland.	Do.,	Hand Loom, weaving Damask Tablecloth.

OFFICE.

134. Millar & Beatty, ..	Dublin,	Furniture, including Tables, Chairs, &c., also Carpet.
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GROUPS.



DUBLIN : Printed for His Majesty's Stationery Office,
By ALEX. THOM & Co. (Limited), 87, 88, & 89, Abbey-street.

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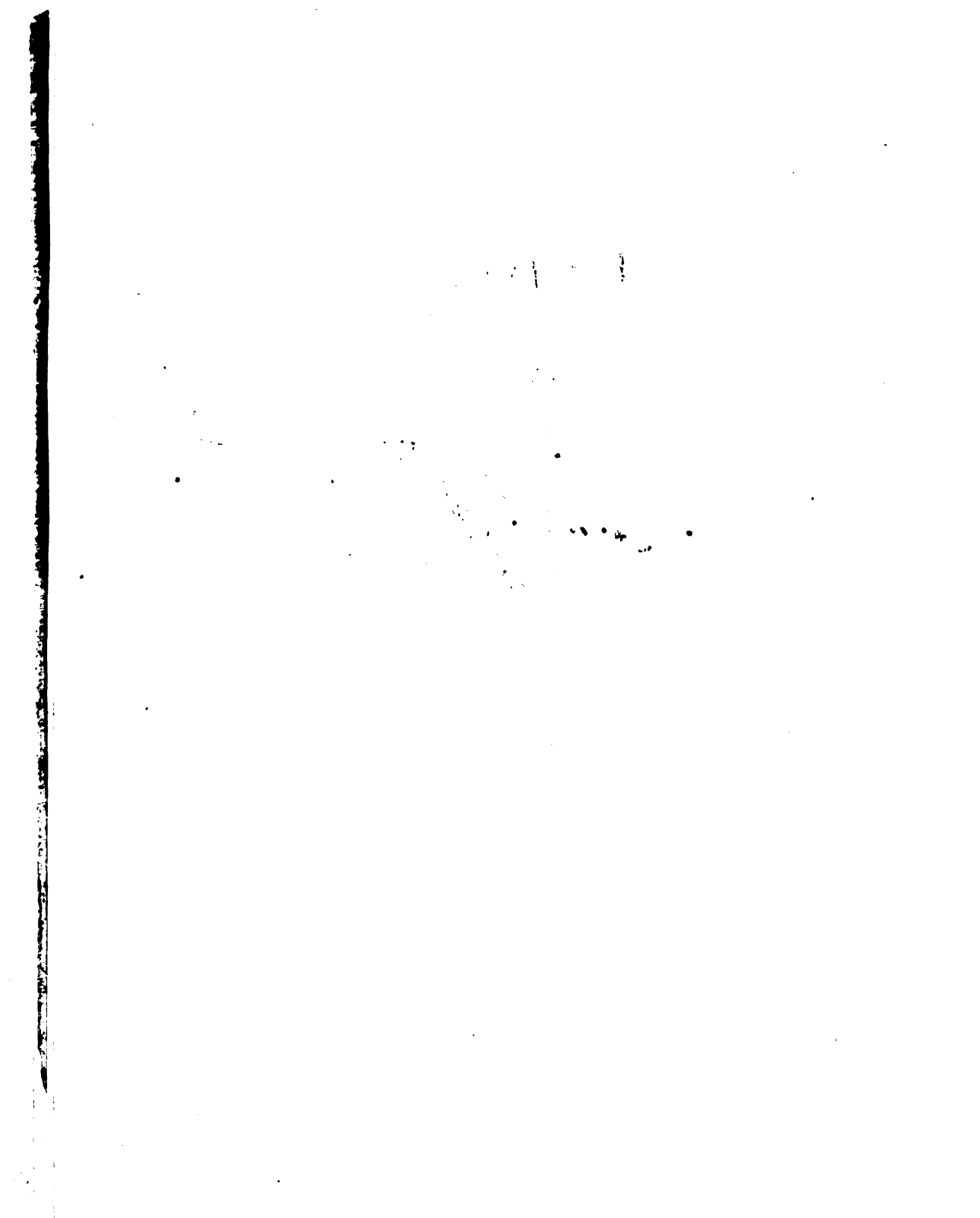
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